WETLANDS

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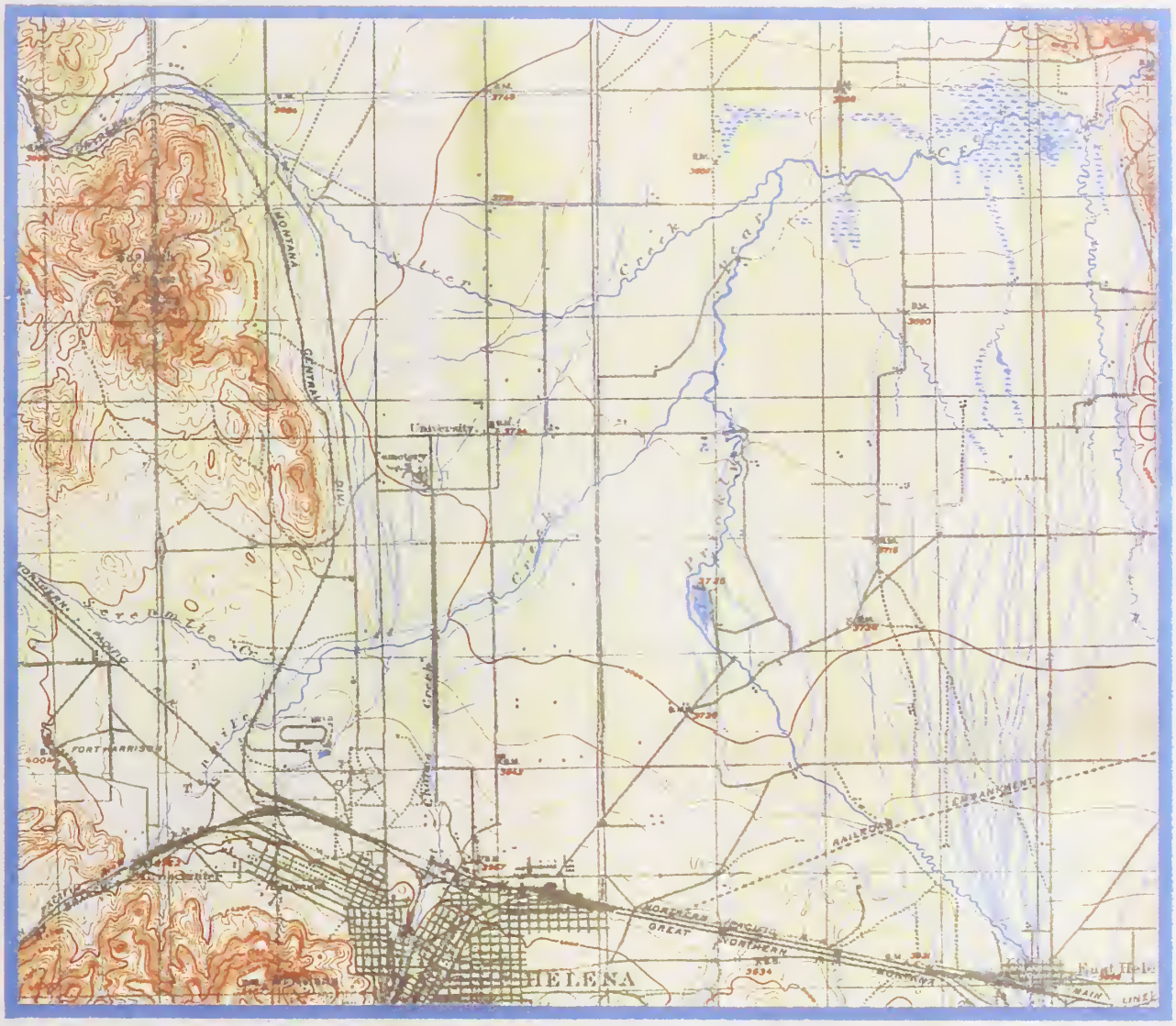

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WETLAND RESOURCES ASSESSMENT
HELENA VALLEY, MONTANA

A WETLANDS COMMUNITY PARTNERSHIP PROJECT

Prepared by: The Wetlands Community Partnership

Prepared for: Montana Department of Environmental Quality
and
The Helena Community

February, 2001

To obtain a copy of this report contact the Lewis & Clark County Water Quality Protection District, Helena, Montana (406) 447-1668

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WETLAND RESOURCES ASSESSMENT:
A HELENA WETLANDS COMMUNITY PARTNERSHIP PROJECT

This report documents the findings of the Helena area wetlands assessment as funded by EPA Wetland Grant Program under the administration of Montana Department of Environmental Quality, Contract 280088. This local government grant was sponsored by the Lewis & Clark County Water Quality Protection District, Helena, Montana. The report describes the project findings and accomplishments as well as documents how the project was completed. The report is organized to follow the grant application and include the detail of what was accomplished. Supporting information is included in the Appendices. The report is intended to serve as a model for other communities to pursue wetland resource inventories. A "comment paragraph" is included under the Task headings to provide the reader with insight gained by the grantees over the life of the project.

MAJOR PROJECT GOALS

The major goals of this project were to perform a baseline wetland inventory, including historical documentation, of Helena area wetland resources and to produce current and historical maps, along with an educational program for both the Helena community and other interested cities across Montana. The project used a community partnership approach including volunteers, professionals, and local government agencies. The purpose was to raise awareness and increase our knowledge base of wetlands in the Helena community, as well as provide the Lewis & Clark County Water Quality Protection District and the County Planning Department with the information necessary for watershed planning and protection through a better understanding of our wetland resources.

This project was the first local government grant of this type to be awarded by the EPA Wetland Program. Therefore, the project was also a pilot study of how a community-based effort might be achieved. The Partners were able to change the "project path" in response to constraints and opportunities as they inevitably arose.

The goals of the Project also parallel the goals the State of Montana is working toward. Montana's "Draft Conservation Strategy for Montana's Wetlands" includes a goal "...to build a wetlands conservation program to achieve no overall net loss of Montana's remaining wetland base, in terms of quantity and quality, to conserve, restore, enhance and create wetlands where feasible, and to increase Montana's wetlands resource base." The purpose of the Strategy is based on the recognition that healthy wetlands are important to our communities and that maintaining fully functioning wetlands should be a conservation priority. The first identified objective is "Improving the Wetlands Knowledge Base" including endorsing and facilitating the completion of a voluntary baseline wetland inventory.

PROJECT DESCRIPTION

To accomplish the Project goals, the Partners performed the following tasks:

- Collaborate with various groups, individuals, and agencies interested in the protection and conservation of wetlands. Identify mutual goals.
- Compile existing data available for Helena area wetlands identification, including historical photographs, soils maps, existing NRCS wetlands inventory, infrared and black and white aerial photography, and National Wetlands Inventory maps, if available.
- Draft two baseline maps, historic and current, based on existing data.
- Coordinate trained volunteers to conduct "ground-truthing" of the compiled base maps under the guidance of professional wetland scientists.
- Finalize a set of base maps (current and historic) for continued work on wetland restoration and conservation by local government, conservation groups and the public.
- Produce an appealing brochure for the public to raise awareness about the value of local functioning wetlands and wetland issues.
- Develop a "Road Show" to take to other communities who are interested in developing a similar process for protection of their wetland resources.
- Present the project and findings to Lewis & Clark County Board of County Commissioners, City-County Planning Board, Water Quality Protection District Board, and the Montana Wetlands Council.

GRANT DETAIL

This project was funded from July 1, 1998, through June 30, 2000. The 1998 104(B)(3) funds requested was $60,533. The EPA required 25% match was $20,182, for a total project cost of $80,715. No other federal funds were used. The Grant Budget is included in Appendix 3.

THE PARTNERSHIP

The Wetlands Community Partnership (Partnership) includes local government agencies, biologists with expertise in wetlands science, and non-profit organizations. The current partners are:

Kathy Moore	Lewis & Clark County Water Quality Protection District
Susan Palermo	Lewis & Clark County Water Quality Protection District
Mike McHugh	Lewis & Clark County Planning Department
RJ Zimmer	L & C County Information and Technology Services
Janet Ellis	Montana Audubon
Susan Lenard	Montana Audubon
Charles van Hook	Montana Wetlands Trust
Pam Hackley	Consulting Soil Scientist
Last Chance Audubon Society	

A description of the Partnership members and a complete list of volunteers and others who provided advice to and support for the project is in Appendix 2. We gratefully acknowledge all of those who have lent their generous time and thoughts to ensure the successful completion of the project.

BACKGROUND

The project study area is inclusive of the boundaries of the Helena Valley. The Helena Valley which includes the incorporated cities of Helena and East Helena, has a population of 48,290. The boundaries are encompassed within Townships 9, 10, and 11 North, Ranges 3 and 4 West and covers about 64 square miles. The Helena Valley sits at the base of the eastern flank of the Continental Divide. The area is a gently sloping alluvial plane, comprised of Quaternary fill (cobbles, gravels, sands, silts and clays). The Helena Valley is drained by a network of intermittent and perennial streams. Prickly Pear, Tenmile, Threemile, Sevenmile, and Silver Creeks converge at Lake Helena which drains to the Missouri River.

Lewis & Clark County has inventories of important agricultural lands, soil types, roads and bridges, wildfire hazard areas, historic and cultural resources, earthquake faults, endangered plants and animals, and others. However, very little information existed regarding the locations, size and types of wetlands in the Helena Valley. Only a small portion of Montana has been inventoried by the U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) program. These maps did not cover the Helena Valley.

Numerous acres of wetlands have been altered or lost to municipal, industrial, or agricultural purposes due to significant growth in the Helena area. Existing wetlands and the functions they provide are continually threatened as increasing residential and commercial growth occurs in desirable locations that often coincide with streams, riparian, and wetland areas.

Stormwater runoff produced by rainfall and snowmelt runs off the City of Helena's steeply rising terrain to street drains routed into detention basins and wetland areas at the city's northern edge. These stormwater retention facilities overlie the Helena Valley aquifer, which is the sole source of drinking water for approximately 20,000 Valley residents. Because of the current stormwater runoff control system, wetlands and the Helena Valley aquifer are exposed to pollutants contained in stormwater runoff from the City of Helena. Preliminary results of water quality and soil sampling in the area wetlands show evidence of heavy metal and pesticide contamination (Drake 1995).

Property owners and residents along Tenmile, Sevenmile, and Prickly Pear Creeks and in watershed lowlands have routinely experienced damage to personal property due to floods associated with spring runoff and unpredictable winter thaws. Removal of previously existing, properly functioning riparian and lowland wetlands has significantly reduced the ability of the land to naturally store high-water flows. Continued destruction of riparian and Valley wetlands will only exacerbate problems associated with runoff, high streamflows and flooding.

During the 1950's, the Bureau of Reclamation sought to increase agricultural production within the Helena Valley by establishing a 41-mile network of open and

buried drains designed to decrease waterlogging of fields in the lower portions of the Valley. An irrigation canal was constructed to carry water to improve agricultural production in the Valley. These actions have resulted in the draining of numerous acres of historic wetlands and the loss of natural infiltration and groundwater recharge areas.

These combined wetland losses have reduced the wildlife habitat base which supports numerous species that depend on wetlands for some part of their life cycle. Birds especially need wetlands and riparian areas. In Montana, more than 50% of our bird species depend upon or frequent wetlands. Many of these species use the Helena Valley. For such waterfowl, wading birds, shorebirds, songbirds, upland gamebirds and others, wetlands provide important habitat for breeding, nesting, cover, migration and wintering. Wetlands are vital to fish by providing clean water and habitat for spawning, feeding and predator avoidance. Riparian wetlands also provide critical nesting and wintering habitat for bald eagles, as well as important habitat for a wide range of other resident wildlife, including deer, small mammals, elk, moose and bear.

Concerned with these losses of wetlands, the Partners sought to learn more about the local wetlands and their history and their role in maintaining ecosystem balance in the area. The Partners desired to educate the community about wetlands and the importance of protecting our remaining wetlands resources from future impacts through appropriate planning decisions.

Natural resource and other environmental information is used to address concerns before a subdivision application is submitted. These assessments often identify and require mitigation measures that help to avoid significant negative impacts to resources and to reduce time and expense for developers and landowners. Knowledge about the location and function of wetland resources and recognizing opportunities for protection will further benefit the community.

The current and historic baseline maps produced by the Project with accompanying wetlands information will further benefit County Planning Department by:

- providing additional background environmental data for the update of the Comprehensive Plan for Lewis & Clark County;
- providing an inventory of wetlands useful for pre-subdivision discussions with developers;
- providing background necessary for voluntary wetland conservation efforts;
- providing additional educational tools available for the Planning Department which serves as a clearinghouse for information on development and conservation;

- aiding in the identification of areas that may be useful and important for wetlands rehabilitation, restoration, or wetland banking;

- providing additional information to promote the concept of watershed planning and the connections between our hydrologic systems.

It is important that land use and development decisions be made using adequate and reliable natural resource information. A local, voluntary approach to wetland conservation through education will also help to reduce conflict and protect landowners by assuring greater security for investment decisions and to assist local government in the decision-making process.

PROJECT TASKS

The cooperating Partners in this project developed a phased approach to complete a wetlands inventory and maps, accompanied by development of educational materials resulting from information collected on this project. Trained volunteers worked together with professional wetland scientists to conduct ground-truthing for the inventory.

The following tasks describe the project organization to meet the stated goals.

Task A	Project Start-up and Oversight
Task B	Data Compilation and Pre-Map Development
Task C	GIS Database Training
Task D	Base Map Development
Task E	Historical Map Development
Task F	Classification of Wetlands
Task G	Volunteer Training and Ground-truthing
Task H	Analysis, Interpretation and Write-up
Task I	Brochure Production
Task J	Community Outreach and Education
Task K	Traveling "Road Show"
Task L	Presentation to the Wetlands Council
Task M	National Wetlands Inventory - GIS Data and Ground-truthing

Task A -- Project Start-up and Oversight: *Upon grant award, the partners met to refine and clarify the project goals in terms of community needs as defined by the Partnership. The project team defined participant roles, the project schedule, and coordination of the volunteer program.*

A list of people from other agencies or entities to be contacted for specific needs was compiled. These included the Natural Resource Information System (NRIS) for Geographic Information Systems (GIS) databases, the County Commissioners, Water Quality Protection District Board members, Department of Environmental Quality, Helena National Forest, U.S. Fish & Wildlife Service including the National Wetlands Inventory Center, Montana Department of Fish,

Wildlife and Parks, Natural Resources Conservation Service, Last Chance Audubon Society members, Lewis & Clark Conservation District, Montana Watercourse, and Montana Historical Society.

The partners located and rented a room to set up operations (called the "Clubhouse"). The partners met monthly. The WQPD took the lead in calling meetings, setting each agenda, and recording minutes. The District also compiled quarterly progress reports for submittal to DEQ and tracked and processed payments to each partner. The District also arranged all contracts developed under the project.

The partners communicated in person, by phone, mail, and electronic mail. E-mail proved to be the primary communication mode.

Comment: Success in using e-mail requires that contacts respond to each e-mail so that receipt is assured. If an e-mail message required a response, a deadline was given. Because of the number of people involved in the project, "calendar coordination" was very important. Scheduling dates for some activities was very challenging. An effort was made to provide several dates in advance, especially when "outside" participants were involved. As would be expected, there were times when not everyone could attend a meeting or activity.

As with any long-term project, people involved with the partnership moved on. Although these changes were trying at times, getting new people involved and "up to speed" was rewarding and provided new energy and insights. As a group, it is important to expect change and provide a context that enables smooth transitions. The same need for flexibility pertains to activities that lead to a dead end or the reality that a task can't be accomplished as planned or envisioned. Often times our "dead ends" opened new avenues that were not anticipated.

Task B -- Data Compilation and Pre-Map Development: *The original objectives of this task were to compile information pertinent to wetlands mapping, including existing soils maps, wetlands determinations, ground water information, infrared and black and white aerial photography. A photo base including mappable scale for air photos and color infrared for pre-mapping was to be developed. Also, historical air photos and possibly ground photos which recorded the development of historical wetlands were to be researched and acquired from the Montana Historical Society and other agencies, as appropriate.*

Maps used for reference purposes were USGS 7.5-minute quadrangles (1:24,000 scale) named Helena, East Helena, Scratchgravel Hills, and Lake Helena. These maps give a three dimensional picture of the land surface (topography) and features such as streams, lakes, roads, trails, and other landscape elements on a two-dimensional format (eg. flat map).

Aerial photographs are also a good visual representation of ground features. In particular, wetlands can be highly visible on air photos because they contrast well against other features. The Partners obtained lists from the USGS EROS Data Center

and the USDA Farm Services Administration Aerial Photography Field Office for available aerial photography. Partial black and white coverage was found for 1978, 1984, 1991, and 1995. We also checked with DNRC and Montana Department of Transportation. However, no complete sets suitable for a basemap for our study area (taken at the same time or at the same scale) were available. Color infrared photos from 1984 and 1987 were available for different portions of the study area. The Partners decided not to purchase any of these air photos but instead investigated the feasibility of designing our own fly-over.

A custom fly-over was not an original component of the original proposal. Once the Partners decided this was important for the whole project, DEQ reallocated the funds for the purchase of existing aerial photo to obtain a custom fly-over. The Partners consulted with Montana Aerial Photography (MAP), Inc., Missoula, Montana, to determine the most efficient flyover that would meet our budget. The fly-over provided the most up to date snapshot of the study area.

Color infrared (CIR) aerial photography is by far the best way of imaging wetlands if it can be timed properly (Figures 1 and 2). In a nutshell, the red colors indicate where plants are actively growing -- as plants photosynthesize, green chlorophyll is produced; the CIR film expresses the green as red tones. Because the photos were taken at the end of the growing season when many plants were already dormant, vegetation that was still growing continued to show as shades of red and indicate areas of higher soil moisture content. These conditions were typically due to irrigation of crops, fields and lawns or the presence of wetlands. Standing water shows as black. Asphalt, concrete, and buildings show as blue-gray. Bare ground shows as gray. Textures, shapes, and color tones also give clues to features shown on the CIR photos. Interpretation of CIR photos is always confirmed by on-the-ground surveys to ensure that interpretation of "photo signatures" is correct.

The size and the scale of the photographs were other important issues to resolve. The Partners wanted as much ground surface detail as was available, while limiting the expense and avoiding excessive materials in the form of many square feet of photographic prints. The target was to develop aerial imagery which would work well on the local Geographic Information Systems (GIS) which were based on a scale of 1:24,000. (This is the scale of the USGS 7.5 minute quadrangle where one inch on the image equals 2,000 feet on the ground). The Partners chose to have photos taken at a bigger scale where one inch = 1,000 feet (1:12,000) based upon the following advantages:

- At this scale, there is enough detail of vegetation and water to clearly see wetlands
- Photo prints can be enlarged three to four times without loosing too much detail on a color copier.
- Similarly prints can be easily reduced by 1/2 to get to the 1:24,000 GIS format scale.

Data sources and references about aerial photography and how to obtain it are given in Appendix 4. A more detailed explanation about CIR photography, CIR film, and map scales is in Appendix 5.

The Partners determined that the study area could be effectively covered with 79 frames flown at a scale of 1:12,000 and have 45% overlap for viewing in stereo. Each frame was centered on one quadrangle section which captures a land base covering one square mile. MAP, Inc. flew on September 2, 1998, a clear day, just one day before the first predicted area wide frost. The timing was perfect to capture the best contrast between upland and wetland vegetation.

The next series of steps created a convenient, accurate and functional product for planners, landowners and resource managers to use in future wetlands and other projects. The CIR aerial photos were converted from "raw material" into an accurate and useful image. The photo base was scanned (HP II E color scanner) and converted to digital images. The photos were scanned at 150 dots per inch, a relatively low resolution, to minimize file sizes for faster loading and printing. These digital-photo images were saved as TIFF (Tag Image File Format) files that can be viewed with most image viewing software. The images were registered (geographically aligned), using the County's geographic information system (GIS) software ARCINFO (® ESRI, Inc.).

Registration of digital images was necessary because aerial photos are inherently distorted. Registration is a process that gives each photograph it's place in geographic space. The images are tiled and scaled. The result is a continuous series of photos, which are at approximately the same scale as other digital information on the surface of the earth. The County's existing road centerline coverage in the Helena Valley, derived from GPS observations of roadways, was used to spatially reference the images. The Lambert Conformal Projection (State Plane Coordinates, Montana (zone 2500), NAD 83 meters) was used as the reference coordinate system.

Road intersections shown on the digital-photo images were graphically matched (using the point-and-click process) to the same intersection in the road centerline GIS file (which were verified by on-the-ground GPS readings). Additional GPS observations were required where roadway intersections were lacking on photos. Project volunteers were trained and assisted in collecting this data (described under Task C). When enough control points were recorded, the grid of County GPS data was electronically overlaid upon each digital photo image. The GIS software then adjusted the digital image to fit exactly with the survey data.

Finally, the 79 images were electronically "cut-and-pasted" to create a seamless image of the entire study area (Figure 1). A more detailed description of this entire task is given in Appendix 1. This CIR image was the base on which wetlands mapping (Task M) was placed. See also Task D.

CIR photos had many uses for the Wetlands Community Partnership Project. They were used to:

- pre-map the area while viewing the landscape picture in three dimensions using a stereoscope;
- determine where field work would be done;
- provide the basis for field inventory of wetlands by using color copies;
- for teaching tools;
- create the foundation for the base map -- a picture of wetland resources for public information.

Comment. It would have been more efficient to have taken digital photographs so that the image data could be directly downloaded onto the County's GIS system. Digital photos are well suited to GIS applications. However, the cost of a digital project was beyond the reallocated budget. Instead, the Partners were able to work with the newly-formed County's Information and Technology Services Department to make the conversion to GIS. It took many volunteer hours to complete the process. Also, at the time of the fly-over, digital photos did not produce as crisp an image, when printed, as conventional photography for the chosen scale.

Task C -- GIS Database Training: *The original objectives of this task were to arrange for a one day workshop with NRIS to train the project professionals and volunteers on the necessary data collection techniques, benchmark identification using a Global Positioning System, computer mapping conventions, and field data recording methods necessary to later incorporate data into a GIS database for future interpretation and map development. Prior to field data collection, staff from the Natural Resource Information System (NRIS) were to meet to assist the project participants in determining what data must be collected in order to interface with both NRIS and the Lewis & Clark County Geographic Information Systems' (GIS) data storage.*

At the time the Partners completed the proposal, it was not clear that the County's Information and Technology Services Department (ITSD) would be in place. As described under Task B, staff with ITSD become integral to the Project, so ITSD became a partner with the Commissioners' approval. NRIS provided advice on GIS and assisted in obtaining digitized wetland (hydric) soils information.

The ITSD staff held an evening session for volunteers to describe what GIS and GPS are and briefly describe how the Partners were going to use these technologies to collect more ground control points and map wetlands. Using maps and GIS data for landownership GEOCODES, several volunteers worked with the Partners to develop a plan to gather more control points to fill in the gaps. The ITSD staff trained volunteers to use the GPS equipment and how to use topographic maps and the CIR aerial photos to locate the preselected control points needed to complete the imaging process described under Task B. GPS units were also used to record wetland locations and data into County GIS during field work. Volunteers, in three or four-person teams, took turns directing the team to the points, running the GPS equipment, photographing the ground locations and taking notes.

Individual teams arranged other days to gather more data, as their schedules allowed, until all the needed control points were located.

Comment. Volunteer help collecting these additional ground control points was very valuable because it helped the County finish their project more quickly. The location of a few ground control points required crossing private land. Volunteers helped to look up landowner names and phone numbers. Access was requested by team members by phone ahead of time when possible. In some cases, access was requested at the time of the data collection. All landowners contacted were happy to allow access. Since these efforts would be the first exposure that local landowners would have to the project, the Partners and volunteers developed a brief protocol ahead of site visits and offered the Project fact sheet.

The GPS equipment can be a little unpredictable; as novice users, patience was required. In the end, volunteers were enthusiastic and became adept at using the gear.

Task D -- Base Map Development: *The original objective of this task was to compile a base map that conformed to NRIS and Lewis & Clark County GIS standards, using information from previously named sources and with mylar overlays attached. Sets of basemaps would be produced for use by the volunteers.*

Base map development progressed rapidly once the Partners were able to obtain the current CIR photography of the study area (Tasks B and C) and to contract with the National Wetlands Inventory (NWI) Center (Task M) to conduct the mapping of the four USGS 7.5-minute quadrangles that covered the Helena Valley. The NWI mapping is available on the WEB and was easily downloaded to the County GIS. The County ITSD electronically placed the wetlands mapping onto the CIR photo base. This allowed for great versatility for data collection, interpretation, and display. Enlarged field sheets were produced for specific study areas showing NWI mapping on the CIR base. These were used in conjunction with the "hard copy" NWI mapping which is displayed on the USGS 7.5 minute quadrangle base.

The primary display for the project was the the NWI mapping shown on the CIR photo base at a scale of 1:24,000. Only the broadest groupings of wetlands were displayed. Individual NWI map units and labels were not included because the scene would have been unreadable. The map of the entire study area was mounted on a three by four-foot piece of foam-core board. Although this scale is too small to discern fine detail, it is very appropriate for displaying the extent and location of wetland classes in public meetings or as quick reference for planners and other users.

Figure 1 shows a reduced version of the display board. Figure 2 shows a portion of the CIR and final NWI mapping at 1:24,000 scale. Figure 3 shows the same area as that shown in Figure 2. It displays draft NWI mapping on USGS quadrangle base, also at 1:24,000 scale.

Comment. The convergence of CIR photography with NWI mapping eliminated the extensive time it would have taken to compile and prepare overlays of other data sources. Soil survey information was difficult to obtain because the NRCS was digitizing field maps. Therefore the Partners were not able to make use of the maps throughout much of the project. However, staff at NRIS helped to access some hydric soil information from the database, as it became available, which we used as supporting data (Appendix 1). The NRCS soil survey information is expected to be available in electronic format by the end of 2000.

Task E -- Historical Map Development: *The original objective of this task was to compile a historic wetlands map that would conform to the base map. Historical aerial photographs of the Helena Valley would be used as a map base, through photographic enlargement, to match the topographic maps that cover the area. The "historical" map would show areas that may have been wetlands; they were to be verified by ground observations through site visits. Where it was determined that wetlands previously existed, an examination of the site was intended to provide insight into the manner in which the wetlands were lost. The information was to be recorded by categories including agricultural conversion, home construction, road and street building, fairgrounds and park development, parking lot and related commercial building construction, railroad construction, government and municipal buildings and parking.*

Our historical wetlands research proved to be a very interesting endeavor. The Partners were able to only partially meet the objectives, yet found additional information and paths to follow.

Volunteers conducted a partial search of the Montana Historical Society photos for any scenes that may have displayed wetlands, but none were found. One volunteer researched historical writings and compiled a list of quotations about the Helena Valley and water resources (please see Appendix 5 for initial findings). Other documents and maps were discovered in a variety of ways including chance avenues. Some information was gathered during talks with local landowners.

The following documents were located:

U.S. Surveyor General's 1868 maps of the Four Townships covering the Helena Valley showing drainage ways and topographic features. Very wet areas were identified with marsh/swamp symbols.

USGS topographic maps dated 1899, 1950, 1985. We were able to see changes in drainage patterns, riparian area coverage, and location of perennial and intermittent channels.

Lorenz and Swanson. 1950. Geology and Groundwater Resources of the Helena Valley, Montana. USGS Circular 83. Described and displayed "waterlogged" soils.

USDI Bureau of Reclamation. 1973. Map of surface and underground drainage. A study to determine the feasibility of building a large irrigation project in the Valley using water from the Canyon Ferry Reservoir and constructing water delivery canals and drainage ditches (both surface and subsurface) to drain wet soils.

Natural Resources and Conservation Service. Provisional Digital Map of Soils of the Helena Area, in progress.

Black and white aerial photographs (scale 1:62,560) circa 1950; used to support Montana DNRC water rights adjudication process; available through the National Archives but we chose not to acquire these.

Analysis of the Fairgrounds/Tenmile Creek and Lake Helena areas was completed utilizing these resources. This report, Wetlands Yesterday and Today, is included in Appendix 1. The report describes how these areas appear to have changed over the last 130 years and describes the techniques used to develop analysis tools and displays.

Task F -- Classification of Wetlands: *The original objective of this task was to define mapping criteria (map unit size, scale, composition) and classification systems(s). For example, define "ecological" versus "jurisdictional" approach. The Partners were to also coordinate with DEQ Wetlands Coordinator, the Montana Watercourse, and other sources on an appropriate approach to wetlands classification.*

The Partners were to use two methods of wetland type descriptions during the mapping effort. One method, described in Classification of Wetlands and Deepwater Habitats of the United States (Cowardin, 1979), would facilitate eventual incorporation of the area into the NWI mapping program. The second method would utilize familiar, user-friendly names to encourage map use by the general public.

The Partners spent considerable time reviewing many wetlands classification and assessment procedures and discussed the pros and cons of using technical, scientific or more general "user-friendly" terminology. The Partners decided that there were really no "user-friendly" terms because these terms are imprecise. There are no accepted definitions for terms such as marsh or swamp. Because the Partners were able to acquire NWI mapping (Task M), the Partners decided that it was best to stay with these terms for describing wetlands. These terms are used on the quadrangle maps and are becoming more common in state and national discussions.

NWI classifies wetlands using "Classification of Wetlands and Deepwater habitat of the Unites States" (Cowardin et al. 1979). The Cowardin System defines a wetlands:

"Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by

shallow water. For purposes of this classification wetlands must have one or more of the following three attributes:

- at least periodically, the land supports predominantly water-loving plants;
- the land is predominantly undrained hydric (wetness indicators) soil;
- the substrate is non soil and is saturated with water or covered by shallow water at some time during the growing season of each year".

The NWI mapping process is a many faceted activity. Maps show boundaries and wetland classifications on a 1:24,000 scale USGS topographic base map. Wetlands are identified by interpreting aerial color infrared photography. Draft maps are produced, verified by on the ground inventory, and revised, as appropriate, to produce the final map. Maps are produced in "hard copy" and digitized to electronic format.

Wetlands are classified on a hierarchy from general definitions to specific terminologies. The level of detail or degree of information increases for each wetland as one proceeds down the classification system. Wetland classifications are abbreviated on the map with codes using letters and numbers. Figure 3 displays a portion of the Helena quadrangle with draft NWI mapping. The terms, codes, and wetland classifications found in the Helena Valley study area are explained in more detail in Appendix 7. Wetlands in our area were mapped by system, subsystem, class and special modifiers for water regime and hydrologic alteration. A brief summary of terms is given below. Table 1 is a list of wetland classes found in the Valley.

"Systems" are the highest classification level. Systems are defined as wetlands that share the influence of similar hydrologic, geomorphologic, chemical, or biological factors. Systems group major categories that have recognizable and commonly accepted terms such as lakes, rivers, and marshes. They describe wetlands broadly as:

Riverine (R)	Water within a channel flowing either perennially or intermittently (rivers, streams)
Lacustrine (L)	Water in a depression, generally >20 acres (lakes)
Palustrine (P)	Water in a depression, generally <20 acres and less than 2 meters (6 feet) deep (small lakes, ponds, marshes, wet meadows)

Systems are further divided into "subsystems" which describe major hydrologic characteristics. The riverine subsystems are intermittent, lower perennial, and upper perennial. Lacustrine subsystems are limnetic (water >6 feet deep) and littoral (water <6 feet deep). Palustrine systems do not have subsystems.

Subsystems are divided into "classes" which describe whether a wetland is dominated by vegetation or unvegetated substrate. If the wetland has greater than 30% plant growth (e.g. cattail or willow), then a vegetated class is used (e.g. emergent or scrub-shrub, respectively). If the wetland is less than 30% vegetated (e.g. mud, sand, gravel) then the substrate determines the class (e.g. unconsolidated shore or unconsolidated bottom).

Table 1. Quick Cross Reference of Map Codes to Common Wetland Types in the Helena Valley (using System, Subsystem, and Class)

Map Code	Common Name or Wetland Type
	Palustrine
PEM	Emergent marsh, wet meadow, slough
PAB	Pond with floating or submerged aquatic vegetation
PUS	Wetlands with exposed substrate
PUB	Pond with open water
PSS	Shrub wetland, short, woody vegetation adjacent to streams
PFO	Forest wetlands, tall woody vegetation adjacent to streams
	Riverine
R4SB	Intermittently flowing water in a stream channel
R2UB	Slow moving perennial river with a floodplain (e.g. Tenmile Cr.)
R3UB	Fast moving perennial river with no floodplain
R2US	Bank or sandbar of slow moving stream
R3US	Bank, cobble/gravel bars, point bars of fast moving streams
	Lacustrine
L1UB	Deepwater zone of lake (e.g. middle of Lake Helena)
L2US	Lake shoreline or shallow water zone of lake
L2AB	Shallow lake with submerged or floating plants

Cowardin et al. (1979) provides many modifiers to further describe wetland features. Perhaps most important of these modifiers are the "water regime modifiers." Water regime modifiers are defined in terms of the growing season and qualitatively describe the general length of time water may be expected to exist in a wetland. Natural or man-made modifications (excavated, impounded, diked, partly drained, farmed, and artificial) were also mapped. See Appendix 7.

NWI maps provide an excellent source of general wetland locations, boundaries and characteristics. However, as stated on each NWI map, NWI maps are not a substitute for on site specific investigation when detailed information is required. See Tasks G and M for further discussions on NWI mapping for the Helena Valley study area.

Task G -- Volunteer Training and Ground-truthing: *The original objective for this task was to continue volunteer training on the identification and classification of wetland vegetation, wildlife species, hydric soils, and the use of photos and maps for wetland inventory purposes. Trained volunteers of four-person teams (3 volunteers, 1 professional) would visit pre-mapped sites to confirm and refine boundaries and classify wetlands. All pre-mapped delineations were to be visited. An initial map would be prepared for use in field ground-truthing of existing wetlands. Volunteers and trained, certified wetland professionals would complete a field ground-truthing of the photo-based maps. Wetland location, type and determining factors would be recorded on mylar overlays and field notes.*

VOLUNTEERS COLLECTING FIELD DATA

Lake Helena, West End
Greasewood upland transition to Rush dominated wet meadow, 7/24/99

ake Helena, West End
alustrine Emergent Wetland
ush dominated wet meadow,
24/99

Railroad Line Junction
Wetland Mosaic: Palustrine forested, scrub-shrub and sedge meadows bordering Riverine wetlands, 7/8/99

The Last Chance Audubon Chapter members served as volunteers for this Project. The Partners conducted workshops to train volunteers in wetland identification and assessment. The volunteers provided expertise in many areas including wildlife and bird observations and helped to critique the field methods the Partners used. Volunteers worked on many aspects of the Project including GPS and wetland data gathering, historical research, GIS assistance (planning and execution), landowner/plat map searches, photography.

The Partners prepared and conducted six training workshops:

- Wetland plant identification in the field
- Wetlands 101 in the classroom (slide show and expanded subject training including vegetation, soils, and hydrology)
- GPS equipment and data gathering workshop including training on how to use maps and air photos and Project base maps.
- Wetland inventory workshops
  - Classroom session to walk-through the field forms and how to gather data
  - Field tour with National Wetlands Inventory mappers
  - Field orientation for wetland data collection

The Partners developed an identification guide and key for selected plants in the Helena Valley. The Partners included both wetland and upland plants -- those that the Partners thought would be most commonly encountered. A draft guide was developed for use in 1998. Over the winter of 1999, the Partners expanded the guide and decided to format it using the approach developed by the Montana Forest Stewardship Program. The final guide is found in Appendix 9.

The field work focused on ground-truthing the NWI mapping. Field forms were developed to collect data to verify and describe the NWI map units. The form was self explanatory so that "page flipping" and the need to consult other sources or directions was minimized. The forms were also designed to be compatible with entering much of the information on the GPS units when locating the wetland plots on the ground with GPS. This data entry task also required developing a GPS "data dictionary" and loading it onto the GPS units. Field forms, field kit list, and information guide are provided in Appendix 8.

Three to five hour field sessions per team were scheduled. A team consisted of one professional and 2-4 volunteers. The team met at the Clubhouse to go over the field plan with air photo/NWI wetland basemaps, pick up the GPS units and the field equipment kit, and organize the team into one vehicle. In the field, team members chose duties and followed the sampling and recording protocols.

Comment. Volunteers provided invaluable time and expertise for many aspects of the Project. Their participation greatly improved the products and outcome of the Project including ground-truthing. However, there were limitations. Although volunteers can provide valuable expertise and excellent data collection, they are usually not as adept at collecting data and negotiating terrain. Physical stamina of

volunteers who are not used to field conditions can limit their participation. Safety must be a primary concern, so it must be integrated into the training -- provide a list of recommended clothing, each team should carry a basic first aid kit; discuss proper use of tools and equipment (especially shovels); extra water should be available in the car pool vehicle.

Schedule coordination was done well in advance and a calendar was posted in the Clubhouse. Calls were made a few days ahead to confirm schedules. Fifteen field sessions were held in July and August 1999. Each volunteer was reimbursed for mileage when he/she used their vehicle.

The Partners did not accomplish the level of field checking and expanded mapping planned. There were several reasons for this. We did not build in enough time for professional wetland scientists to supervise the field effort and fill in gaps not completed by volunteer teams. The Partners overestimated the amount of time volunteers could spend in the field as well as the rate of work that could be completed. Volunteers also had particular interests - so we tried to tailor the field trips to allow each person to explore his/her interest, while at the same time collecting all field data needed per site. Much of the study area is privately owned. To gain access, it was necessary to contact landowners ahead of time. This process was extremely time consuming for a variety of reasons. The Partners did not factor this task into our plan, therefore we chose two focus areas to concentrate the field effort.

Despite not meeting the target for this task, the work accomplished was solid. Volunteer participation was key to expanding the level of awareness about wetlands. In a community project such as this, there is a balance between education and production that must be recognized and struck.

Task H -- Analysis, Interpretation and Write-up: *The original objective of this task was to analyze and interpret the collected data. Maps made by volunteers were to be checked for substance and accuracy; confirming that maps complied with NRIS mapping conventions agreed upon in training completed in Task C for future GIS mapping; describing the methods and results in written format, including a historical perspective from analysis of former maps; and developing two final maps from team base maps, including all old and new wetlands information.*

The Partners selected two areas to ground-truth -- the Fairgrounds/Tenmile Creek wetland complex and the west end of Lake Helena wetland complex. The results of this task are the report Wetlands Yesterday and Today (Appendix 1) and the final display map produced using GIS data layers for NWI mapping on the color infrared photo base. Figure 1 is a much reduced copy of this final product. It shows, at a glance, the location of palustrine wetlands, lakes (lacustrine wetlands), and stream corridors.

Task I -- Brochure Production: *The original objective of this task was to develop a color brochure, including user-friendly historic and current wetlands maps, that*

would heighten citizen awareness of the Helena area wetland resources, and provide a basis for other communities that wish to develop a similar product.

Once the project was off the ground and preliminary findings had been made, a brochure was developed -- please see Appendix 11. The brochure has been widely distributed and will continue to be as part of on-going activities of the Partnership members.

Task J -- Community Outreach and Education: *The original objectives of this task were to develop and hold a series of community presentations about the wetlands project; write newspaper articles for publication; create an interesting display board for community events held at the public library, mall, and other public places; present talks at professional conferences regarding the community process used to complete the inventory. The brochures and the maps were to be made available to the public.*

The Partners developed a slide show called "Wetlands 101." The slide show covers 1) what wetlands are 2) why they are important (the functions they provide) 3) why we want to protect them.

One person was in charge of contacting organizations that might be interested in the presentation. Then a partner was selected to make the slide presentation and finalize dates and arrangements. Each presenter introduced the organization to the Partnership and the Project and tried to generate interest about wetlands in our area. Attendees were encouraged to attend the Helena seminar and to tell others about it. Each presenter tailored or edited the slide show and script as needed. Presentations lasted from 20 to 45 minutes depending on the audience. As the Project progressed, the Partners developed additional display materials that were used in presentations. We presented the show to a wide variety of organizations ranging from groups of 10 to 125 people. Each Partner was able to present at least one show. The Partners provided all presentation materials and equipment, including projector, screen, easels, etc. The script, photo credits, and list of groups to whom the Partners presented the slide show to are in Appendix 10.

Under this task, the Partners also developed a fact sheet. A professional artist, was contracted to develop a logo for the Partnership which was used on outreach materials and letterhead. The fact sheet, brochure and a copy of the "A Landowners' Guide to Montana Wetlands" (published by Montana Watercourse) was made available to those attending each presentation. These materials are in Appendix 11.

Task K -- Traveling "Road Show:" *The original objectives of this task were to develop a simple, chronologic write up (basic primer) and photographic history of the project, with a portable display, to be transported to five interested communities as part of an all-day workshop presentation. A panel discussion, with project participants, would discuss how the project was completed, including successes and obstacles.*

Wetlands seminars were presented in the spring of 2000 -- Hamilton (April 14-15), Bozeman (May 24), and Kalispell (May 31). The largest presentation was organized for the Helena community, on May 22. Each "show" was organized in conjunction with local groups that were interested in water resources. The Partners joined efforts with Montana Watercourse which was conducting workshops around the state. We worked very closely with each group and tailored each presentation to fit their needs and interests. The format and timeframe for each show was very different. The emphasis of our presentations in other communities was on what the Partnership had accomplished and how we did it. Specific findings were used to illustrate the approach. For the local Helena presentation, The Partners focused on the findings and what functions wetlands provide for the community, including the "successes and obstacles" encountered with the Project. All sessions included other speakers who were conducting related projects (for example - watershed workshops, habitat improvement, stream and riparian corridor restoration). In Helena, there was a lengthy question and answer period.

Flyers, agendas, and media coverage (if appropriate) for each show as well as items provided to each audience (the Wetlands Community Partnership Brochure, Fact Sheet, and "A Landowner's Guide to Montana Wetlands") are included in Appendix 11.

Comment: Sharing the Wetlands Community Partnership with other communities was a very rewarding aspect of the Project. Each "home" group was effective at getting a good turn out. Attendees were always very interested in what we had to show them. However, because each presentation was tailored for the particular event, this task took more time and planning than originally envisioned. In the end, though, it seemed more appropriate not to have a "canned" road show.

Preparing for these events requires a lot of time and good communications. It was essential to organize several months ahead of the event to schedule meeting place, arrange for other speakers, and develop the media campaign. All "shows" provided a meal -- this really does seem to help with turn out and also provides for "free" time for people to mingle and look at displays.

Task L -- Presentation to Wetlands Council: *Present the project and its products to the Wetlands Council at one of their regularly scheduled meetings as a way to share the process and results of the project.*

A presentation with slides and display items was made to the Council in February 1999.

Task M. National Wetlands Inventory - GIS Data Gathering and Ground-truthing. *This task was added to the project and reflects ideas and efforts made by the review committee to make the project better. The objectives of this task were to acquire GIS data layers of National Wetlands Inventory (NWI) for the four project area USGS*

quadrangles and to work with U.S. Fish and Wildlife Service NWI staff to integrate the field ground-truthing of the four quad area into final NWI maps (hard copy and electronically compatible form).

The Partners contracted with the NWI Center in Denver to complete this mapping. NWI staff had been contacted prior to this time to ensure that we could, in fact, accomplish this task. There were several stages to this task. Preliminary mapping based on NWI photo interpretation of several diverse areas was sent to the Partnerships's wetland specialists who conducted a quick field review of theses areas to provide specific vegetation information and general description of the wetlands. Draft NWI maps were produced and sent to the Partners. These maps were used to start the field data collection efforts.

The NWI team scheduled a two-day site visit to field check their draft maps. The Partners and several volunteers accompanied the NWI team to the Tenmile Creek area near the Green Meadow Golf Course, which offered a wide variety of wetland types and hydrologic conditions to assess. This field trip served as a training opportunity for volunteers as well. Over the next several months the NWI team finalized the maps, including conversion to electronic format. Hard copies were sent to the Partners and the electronic data was sent to ITSD. This data is also available on the NWI web site. The ITSD, with volunteer assistance, created a GIS layer to be compatible with the CIR base described in Task B.

Appendix 4 lists people to contact in NWI as well as references that describe in detail what NWI is and how the inventory is done including the rigorous conventions or protocols for photo interpretation, map production and conversion to electronic data. Appendix 7 summarizes this information as it pertains to the Project.

The NWI wetlands mapping was consistent and accurate. However, there are limitations due to the scale of the mapping produced and the 1984 and 1987 CIR photography that was used. The Partners found that many wet meadow areas that were dominated by wetlands (hydrophytic) grasses and that had shorter wetland hydrologic periods, yet still met Cowardin wetland criteria, were not mapped. In discussions with NWI team, the Partners determined that this is not an error but a matter of not being able to identify a reliable "photo signature" at the scale that NWI mapping is produced. Also, because 15 years had passed, some areas that now meet forested criteria were mapped as shrub wetlands. These kinds of issues are always encountered with any resource mapping effort. One must understand the objectives, limits, and capabilities of each process. It also further emphasizes that site specific investigations must be conducted when more detailed information is required.

Comment. The NWI team was great to work with. They were enthusiastic about what the Partnership was doing and provided lots of insights. The Partnership was very fortunate to have them complete wetlands mapping for the four-quadrangle area that includes the Helena Valley.

CONCLUSIONS

❖ The Wetlands Community Partnership project is an innovative pilot program for Helena. The techniques developed and employed during the assessment provide a basis for development of protection and restoration strategies for other Montana communities to prevent further reduction and mitigate impacts to wetlands threatened by growth and development. These techniques were also used to develop informational materials, tools, and methods to disseminate the materials to the local community, service groups, citizens, and students.

❖ The Project used a collaborative approach to identify wetland resources and raise awareness about their importance to the community. The success and strength of the project are found in the cross-section of people representing many groups and areas of expertise. The involvement of Audubon volunteers broadened the expertise of the project and made the project much more enjoyable.

❖ The Project explored sources of local resource information which were combined to illustrate wetland resources both current and past. These tools included aerial photography (CIR and black & white), literature review, historical maps, National Wetlands Inventory, Natural Resources Conservation Service soils information, area drainage projects (including the Bureau of Reclamation/Helena Irrigation District), and Lewis & Clark County GPS surveying.

❖ A current (1998) set of aerial color infrared aerial photographs were taken of the study area. The new CIR photos were scanned and the digital images were rectified to create a seamless image of the entire landscape. This image is invaluable for illustrating wetlands and will be helpful in studying other local resources. These photos are now available for county staff, landowners, developers and interested citizens to use. The County is in the process of making these images available on their WEB page.

❖ Combining information layers such as soils, CIR photos, and the NWI information allows instant visual comparison of the completeness and accuracy of each information source and provides a cumulative illustration of wetland conditions. These information layers are to become part of the County's GIS database.

❖ The NWI is accurate for the scale at which it is produced and is a useful tool as the first step in planning. However, no matter how good the information base is, it is still necessary to do field work to ground-truth or calibrate the use of the digital images and mapping. The field work and digital images indicate considerably more wetlands in the area than were shown on the National Wetland Inventory. The NWI mapping and evaluation is for planning purposes. Any future site development considerations must be visited by someone qualified to perform wetland delineation.

❖ This inventory of wetlands focused upon discrete areas and is not a complete resource assessment. The areas focused upon were presented to allow an appreciation:

- of the limitations of historical information and how to use the limited information available, and

- to show that no single resource information source will adequately define the existing wetland resource, ie. aerial photos must be ground checked, soils and NWI maps do not adequately represent the resource except where used together and with careful site observations.

❖ The assessment of wetland "focus" areas combined with historical data collected showed that wetlands in the Helena Valley have been extenstively altered and that considerable wetland acreage and function have been lost. Wetland loss is clearly evident along the stream corridors (Tenmile, Sevenmile, Prickly Pear and Silver Creeks). This has resulted in a very fragmented, disconnected wetland and riparian system.

❖ Wetland loss and threats to natural function continue as our community grows and development pressure increases, especially in lowlying areas and along stream corridors and floodplains. Flood control (attentatution and storage) is probably the most affected natural function. Other key functions that have been affected include groundwater recharge, water purification, and wildlife habitat.

RECOMMENDATIONS and FUTURE OPPORTUNITIES

There is still work to be done. This project has opened the door to opportunities that can further wetlands education and protection strategies in the Helena area. The Partners would like our community to adopt a policy to continue wetland inventory and evaluations and to strive to protect, conserve and, where possible, restore wetlands that we have lost. Recommendations include:

❖ Continue to educate local decision-makers and Helena area residents about the value of wetlands:

- Develop a local wetlands education campaign which utilizes the best suited channels of communication
- Develop options and incentive programs for wetland landowners
- to interested people
- Organize a"Know Your Wetlands Weekend" in Lewis & Clark County
- Prepare display and poster sessions at the Lewis & Clark County Fair
- Write at least one article for local publications -- for example, Lewis and Clark Conservation District, Montana Audubon, and Helena Area Chamber of Commerce,
- Develop a "wetlands Series" with the Helena Independent Record
- Create a Wetlands Community Partnership web site.

❖ Educate decision makers and others about the many practical and logistical considerations that are in the best interest of the County and its citizens. For example, it is expensive to build facilities (such as structures, septic systems, roads) in wetlands because wetland soils have poor strength and drainage requires engineered solutions. Extra maintenance and unnecessary repair expenses are common for facilities built on wetlands. Wetlands provide many functions that perform best when wetlands are intact and interconnected. Some of these functions include water purification, recharge to groundwater aquifers, flood attenuation, open space and wildlife habitat. Protection of wetlands is a low cost and effective way to provide clean water.

❖ Incorporate wetlands mapping and assessment in planning processes, such as septic system permitting. A professionally trained wetland specialist is needed to accurately delineate wetlands and describe functions as well as assess the impacts of any development on a case-by-case basis. This person could be county staff or serve as a consultant to a permit applicant with adequate, objective oversight on behalf of the public interest. The County should have guidelines for the information they expect (mapping, potential impacts assessment, mitigation) and qualifications criteria of professionals that prepare such analyses.

❖ Develop a list of Helena Valley wetland sites best suited for protection or restoration. Suitability criteria would include ecological importance and feasibility.

❖ Develop a list of wetland landowners in the Helena Valley and advocate for wetlands protection to key stake holders based on information gathered by the Partnership in this Project.

❖ Conduct seminars for county commissioners, permitters, developers, surveyors, landowners, realtors to motivate the attendees to be self-regulating and to provide them with the knowledge of where to get more information if they need it.

❖ Provide options to decision-makers and local citizens about ways to protect and preserve wetlands, including a complete list of options and incentive programs for wetlands landowners.

❖ Develop a replacement or restoration strategy for areas, especially for wetlands that are of marginal or low priority, so that development interests can assist in watershed improvement with mitigation projects in other areas of high priority.

❖ Explore a tax incentive for wetland conservation.

❖ Seek high priority sites for developing recreational and educational programs based upon wetland habitat values and community needs for other wetland functions.

❖ Inform decision makers and planners about wetlands regulatory requirements under the federal Clean Water Act.

❖ Explore successful models for local wetland management and conservation such as Special Area Management Plans as provided by the Corps of Engineers.

❖ Adopt a wetlands inventory and conservation program. Such a program could easily embrace the above recommendations. Why adopt such a program?

1. Helena area citizens, government, and the private sector can share a common information resource which will help in making financial, planning and environmental decisions which may involve wetlands.

2. Documenting and monitoring changes in local wetlands allow a realistic appraisal of the resource and an understanding of where losses have occurred and are currently taking place.

3. The mapping of wetlands shows where the resource does or can overlap with open space, erosion and flood control needs, and valuable wildlife habitat. Mapping can warn us of troublesome sites for construction of homes, businesses, and public infrastructure such as roads. Also, improved knowledge of wetlands will help establish conservation priorities which will complement community management and growth needs. Wetlands mapping will locate good sites for flood control, water storage, stormwater management, and groundwater recharge.

4. Establishing a wetlands inventory and conservation program allows more local control of the resource. Planners will know which areas are most important and will be able to direct restoration or enhancement projects based upon local priorities. Citizens and landowners can help develop wetlands protection policies and participate in restoration efforts. Local involvement will reduce the need for federal "one size fits all" regulatory activities.

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Helena Valley
Wetlands Community Partnership

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G I S

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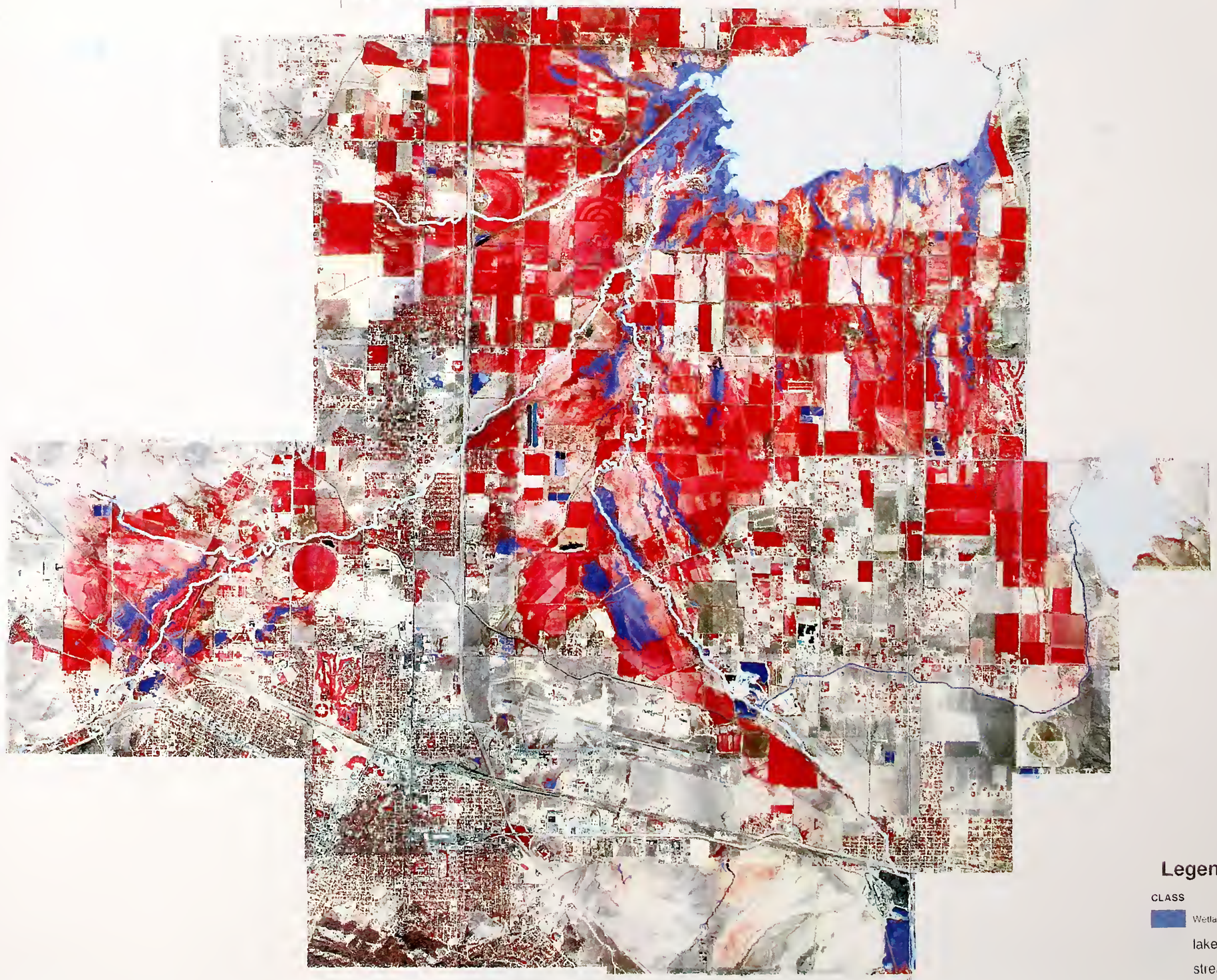
DRAFT

NOTE:

The National Wetlands Inventory mapping shown on this document was prepared primarily by stereoscopic analysis of high altitude aerial photographs. Wetlands were identified on the photographs based on vegetation, visible hydrology, and geography in accordance with **Classification of Wetlands and Deepwater Habitats of the United States** (FWS/OBS - 79/31 Dec. 1979). The aerial photographs typically reflect conditions during the specific year and season when they were taken (7/84 and 9/87). In addition, there is a margin of error inherent in the use of the aerial photographs. Thus, a detailed on the ground and historical analysis of a single site may result in a revision of the wetland boundaries established through photographic interpretation. In addition, some small wetlands and those obscured by dense forest cover may not be included on this document.

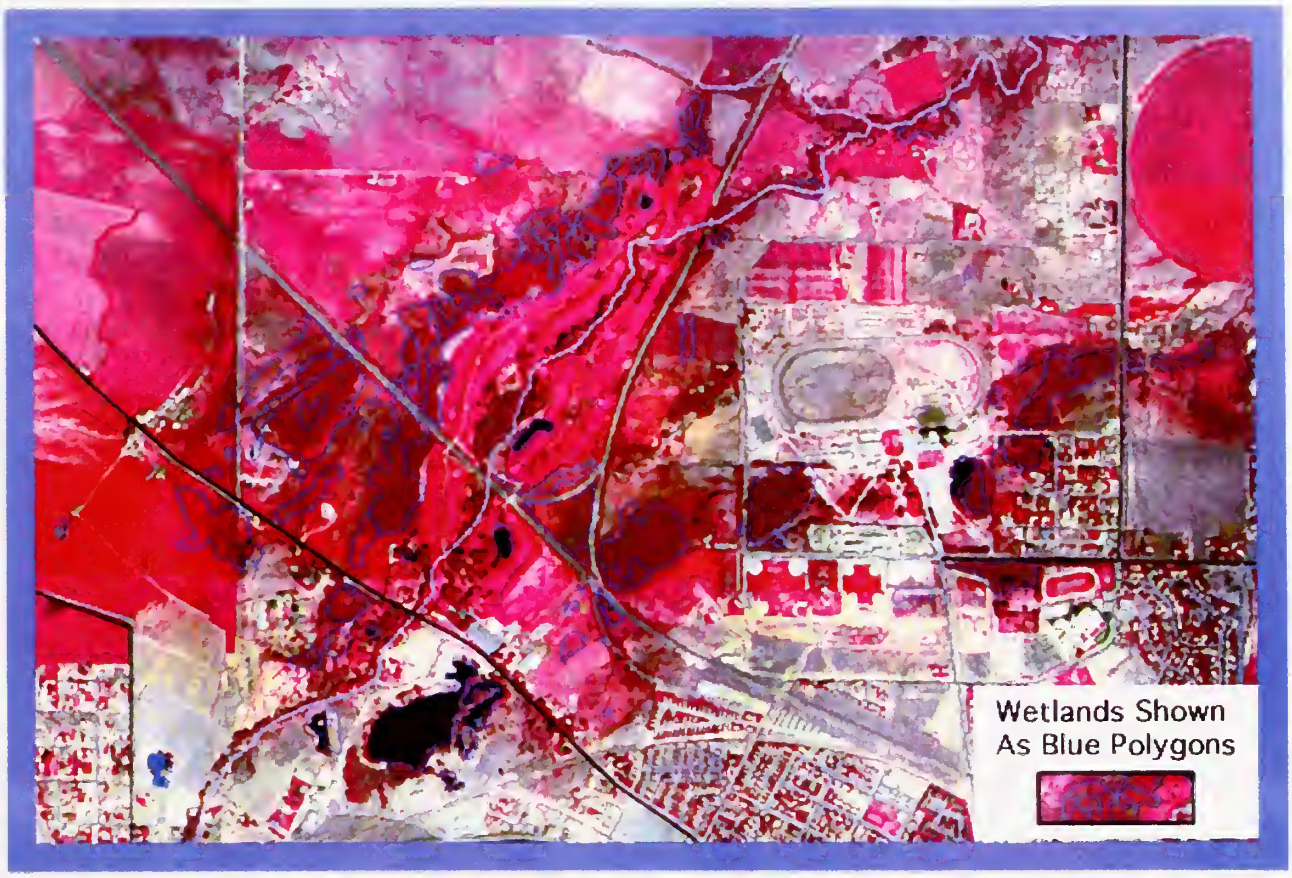
Federal, State, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner that that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, State or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, State or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Helena Valley Wetlands



Aerial photographic base, upon which the NWI mapping is overlain, is color infrared imagery flown 9/16/98. NWI mapping was completed in 1999.

NWI AND INFRARED PHOTO



This graphic illustrates the combination of the National Wetlands Inventory and locally produced infrared photography. Seventy nine aerial photos taken of the study area were digitized, flattened and overlapped to create a continuous image of the Helena Valley. IR photos are an excellent way to distinguish active wetlands from the surrounding drier landscape.

The National Wetlands Inventory is now available on the internet and may be downloaded for use as an overlay as seen above. The NWI is formatted to the USGS topographic maps in your area. Here, the wetland boundaries are shown in blue, but the labels shown in the graphic NWI DRAFT MAP have been removed to simplify the image.

NWI DRAFT MAP

This is a portion of a National Wetlands Inventory Map created by the U.S. Fish & Wildlife Service. A portion of the city of Helena is seen in the lower right and the Fairgrounds race track is seen in the top - center. This is a draft map at a scale of 1:24,000 made in 1998 based upon an aerial photo taken in 1987. The wetlands have been drawn over the U.S.G.S. HELENA, MONTANA topo map.

Each wetland is labeled by initials. For example, PSSA represents Palustrine, Scrub-Shrub, Temporarily Flooded.

WETLANDS

YESTERDAY AND TODAY

A LOOK AT THE NATURAL HISTORY OF
THE MELINA VALLEY

THE WETLANDS COMMUNITY PARTNERSHIP
PROJECT — 1989 - 1990

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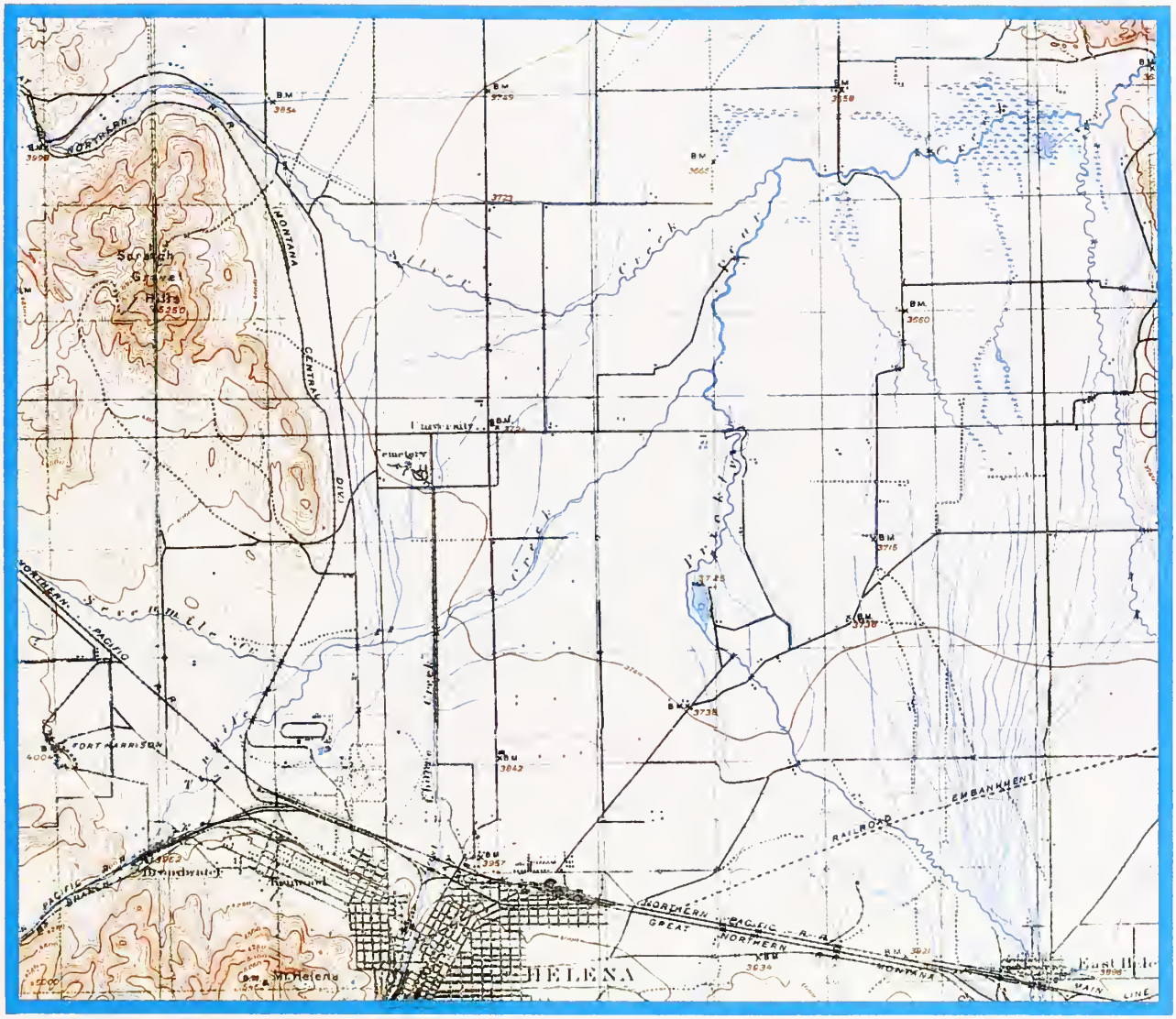
WETLANDS
YESTERDAY AND TODAY



A LOOK AT THE NATURAL HISTORY OF
THE HELENA VALLEY
THE WETLANDS COMMUNITY PARTNERSHIP
PROJECT ~ 1998 - 1999

APPENDIX 1

WETLAND TODAY AND YESTERDAY
A LOOK AT THE NATURAL HISTORY OF THE HELENA VALLEY
THE WETLANDS COMMUNITY PARTNERSHIP PROJECT

This appendix report focuses on the findings of an assessment of two wetland areas in the Helena Valley completed by the Wetlands Community Partnership. A separate report, Wetlands Resource Assessment, Helena Valley Montana, A Wetlands Community Partnership Project, documents the process of how the Partnership completed the project. The Project was funded by an EPA Wetland Grant Program under the administration of Montana Department of Environmental Quality, Contract 280088. This local government grant was sponsored by the Lewis & Clark County Water Quality Protection District, Helena, Montana.

The assessment of the west side Lewis & Clark County Fairgrounds area and the Lake Helena area was accomplished by using tools developed under the Project such as new color infrared aerial photography, National Wetlands Inventory mapping, soil survey information and historical resources (maps, drawings, reports) and Geographic Information Systems technology. A picture of the historic and current extent of wetlands and how these changes may have come about are explored.

The partnership includes local government agencies, biologists with expertise in wetlands science, and non-profit organizations. The current partners are:

Kathy Moore	Lewis & Clark County Water Quality Protection District
Susan Palermo	Lewis & Clark County Water Quality Protection District
Mike McHugh	Lewis & Clark County Planning Department
RJ Zimmer	L & C County Information and Technology Services
Janet Ellis	Montana Audubon
Susan Lenard	Montana Audubon
Charles van Hook	Montana Wetlands Trust
Pam Hackley	Consulting Soil Scientist
Last Chance Audubon Society	

METHODS

One goal of this work is to educate area citizens about the location and nature of their wetlands. This involves demonstration of how to identify wetlands and the combinations of informational resources available to accomplish this. The Partnership acquired National Wetlands Inventory mapping for the Helena Valley. this mapping procedure was developed by the U.S. Fish and Wildlife Service. The maps produce information that is suitable for planning purposes - NWI is not intended to depict site specific conditions.

This wetland inventory project was planned with the understanding that a regulatory delineation (according to U.S. Army Corps of Engineers (COE) procedures) of all the wetland resources in the Helena Valley was beyond the resources available for this project. It is important that any land use changes or development proposals which may affect wetlands be addressed individually and be assesed by a professional who is trained in the COE methods of delineation prescribed and in effect at the time. It is also not the intent of this project to take on any legal responsibility or regulatory character by making formal declarations as to the wetland boundaries or areas at any specific location.

We begin with choosing a place to record all of our information. Today local governments are learning to use a Geographic Information System (GIS) as an efficient and accurate way to store very detailed information which can show landscape locations of resources and structures with a high degree of accuracy.

The Helena Valley study area generally consists of most of the relatively flat terrain adjacent to and north of the city of Helena which is also illustrated by four 7.5 minute U.S. Geological Survey topographic maps named as follows: Helena, East Helena, Lake Helena and Scratchgravel Hill quadrangles. These maps accurately reflect the general shape of the land surface, location of many roads and streams and precisely locate the section corners and boundaries which have been carefully located in the past through surveying. Details of soils and vegetation are not what these maps are designed to show and the fine features of topography are lost by the use of contour lines which represent either 20 or 40 foot changes in elevation; This scale would preclude any subtle, shallow depressions which would likely be associated with with local wetlands. While these maps do not provide the best template upon which to locate wetlands, while they are a very accurate base for locating surveyed structures and geodetic information points.

INFRARED PHOTOGRAPHY OF WETLAND VEGETATION

Because wetlands can be highly visible and a visual representation has a much more user friendly character, it was decided to include aerial photography as a component of our GIS information storage. We checked catalogs of available aerial photo sets for our study area and found no complete sets of photos for our study area which were taken at the same time or at the same scale. Infrared photo sets were very rare.

Infrared aerial photography is by far the best way of imaging wetlands if it can be timed properly. As the vegetative communities awaken from winter dormancy at lower elevations in Montana, the landscape becomes uniformly green because of widely available soil moisture and the beginning of the vegetative growing cycle. With this emergence of new plant tissue, the higher metabolic rate in the tissue produces larger concentrations of chlorophyll cells in the leaves, these cells are essential to the photosynthesis necessary for conversion of water, carbon dioxide

and sunlight into organic compounds needed for plant growth. The specific chemicals used on infrared film react to the narrow wavelength of light which is reflected from active chlorophyll cells; they produce a red color on the film. Therefore, an aerial photograph taken of a freshly revegetated spring landscape will be largely shades of red, except for lakes, roads or parking lots or buildings. As the growing season progresses and the size, shape and metabolism of growing plants changes, numerous shifts in the shades of red reflect these changes on infrared aerial photographs. A more detailed explanation of how color infrared film is useful in determining the condition of vegetation, including distinguishing wetlands is found in Appendix A.

It is easy to understand why wetland plants have a longer growing season throughout arid areas of Montana, and as the season progresses, soil moisture in upland areas runs out and the plants which have evolved there reduce their metabolism and become dormant, often beginning in late July and during August. These upland areas loose their red color as seen by infrared film and turn tan, gray or sometimes whitish, depending on soils or composition of other surfaces. As the upland soil moisture diminishes, the wetland areas begin to stand out in ever greater contrast to their surroundings- of course, so do irrigated areas or forested areas which are deeply rooted into more abundant levels of groundwater. Because of this contrast which occurs with the onset of upland plant dormancy, aerial photography designed to offer the best images of wetlands will be taken near the end of growing season, or shortly before the onset of the first real frost. Upon the onset of frost, much of the above ground plant tissues, even in wetlands, is damaged by the freezing temperatures and rapid loss of the red infrared photo colors will occur. The Helena Valley wetland mapping project was fortunate to have a series of 79 infrared aerial photos taken on September 2nd, 1998, just one day before the first predicted area wide frost.

The aerial photography was performed by MAP, Inc. a contractor in Missoula, Montana. A time was chosen with minimal cloud cover when the sun was at a high angle which provides the abundant light necessary to improve the quality of color infrared photography. An LMK aerial camera with forward motion compensation was mounted in the floor of an airplane for this application. The camera, with a yellow filter had a 6 inch focal length and produced seventy nine 9″ by 9″ images on a continuous 125 ft. length of film. The plane maintained an elevation of 6,000 feet above the surface and made ten passes over the Helena Valley; each flight line was navigated with the help of a GPS system. Photo images were taken as the plane passed above the center of sections of land which produced images with approximately 45% overlap at a scale of 1:12,000 (MAP Inc. 1999, Scott Carr, Dec 13, 1999 by telephone).

The size or the scale of the photographs was another important issue to resolve since we were fortunate enough to choose the scale rather that having to work with

whatever scales found on historical photosets and the limitations they may impose. We wanted as much ground surface detail as was available, while limiting our expense and avoiding excessive materials in the form of many square feet of photographic prints. Our target was to develop aerial imagery which would work well on the local GIS systems which were based on a scale of 1:24,000 or one inch on the image equals 2,000 feet on the ground. We chose to have our photos taken at a scale of 1:12,000 (1"=1,000 ft.) based upon the following advantages:

At this scale there is enough detail of vegetation and water to clearly see wetlands This image is the result of a six inch camera lens 6,000 feet above the surface. These photo prints can be enlarged to 1:6,000, 1:3,000 or all the way to 1:200 on a color Xerox copier and used in detailed field surveys. At this photo scale these enlargements can be made without loosing too much detail.

Worksheets at this scale allow very accurate drawing in of wetland boundaries and photo interpretation of areas larger than those visited. A 1:12,000 image was easily convertible to the 1:24,000 GIS format by reducing it to 1/2 its size. An explanation of scales used on maps and aerial photos is found in Appendix B.

CONVERTING CIR AERIAL PHOTOS INTO into ACCURATE AND USEFUL IMAGE

To provide a convenient, accurate and functional product for planners, landowners and resource managers to use in future wetlands projects, and which was also compatible with the County geographic information system (GIS), the photo base was converted to digital images with the use of a HP II E color scanner. The photos were scanned at 150 dpi, to minimize file sizes so that the digital photos would load and print faster. These digital-photo images were saved as TIFF (Tag Image File Format) files that can be viewed with most image viewing software. The images were then , geographically aligned, or registered, using the County's GIS software ARCINFO (by ESRI, Inc.).

Registration of digital images is a process of giving each photograph it's place in geographic space. This allows the images to be tiled, scaled and overlaid with other map layers. The result is a continuous series of photos, which are at approximately the same scale as other digital information such as landmarks on the surface of the earth. The reference data that used for registration were the county's existing road centerline coverage in the Helena Valley, derived from Global Positioning System (GPS) observations of roadways. Where visible on the photos, road intersections in the photos were graphically matched to the same intersection in the road centerline file (a point and click process).

Those photos or portions of photos that did not have sufficient roadways to match to, required additional GPS observations by project participants of fence corners,

parking lot corners, or any other points that were readily identifiable on the photographs. The grid of county GPS data (roads and additional photo control points) was overlaid upon each digital photo image, in order to match the selected landmarks to their images on the photos. This layering allowed the software to adjust the digital image to become an exact fit with the survey data. The collection of infrared photos thus became a series of spatially referenced image files. The reference coordinate system used was a Lambert Conformal Projection, State Plane Coordinates, Montana (zone 2500), NAD 83 meters.

NATIONAL WETLANDS INVENTORY

NWI classifies wetlands using "Classification of Wetlands and Deepwater habitat of the Unites States" (Cowardin et al. 1979). The Cowardin System defines a wetlands:

> "Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes:
>
> - at least periodically, the land supports predominantly water-loving plants;
> - the land is predominantly undrained hydric (wetness indicators) soil;
> - the substrate is non soil and is saturated with water or covered by shallow water at some time during the growing season of each year".

The NWI mapping process is a many faceted activity. Maps show boundaries and wetland classifications on a 1:24,000 scale USGS topographic base map. Wetlands are identified by interpreting aerial color infrared photography. Draft maps are produced, verified by on the ground inventory, and revised, as appropriate, to produce the final map. Maps are produced in "hard copy" and digitized to electronic format.

Wetlands are classified on a hierarchy from general definitions to specific terminologies. The level of detail or degree of information increases for each wetland as one proceeds down the classification system. Wetland classifications are abbreviated on the map with codes using letters and numbers. Figure 1 displays a portion of the Helena quadrangle with draft NWI mapping. The terms, codes, and wetland classifications found in the Helena Valley study area are explained in more detail in Appendix 7 of the main report. Wetlands in our area were mapped by system, subsystem, class and special modifiers for water regime and hydrologic alteration. A brief summary of terms is given below. Table 1 is a list of wetland classes found in the Valley.

"Systems" are the highest classification level. Systems are defined as wetlands that share the influence of similar hydrologic, geomorphologic, chemical, or biological factors. Systems group major categories that have recognizable and commonly accepted terms such as lakes, rivers, and marshes. They describe wetlands broadly:

NWI DRAFT MAP

This is a portion of a National Wetlands Inventory Map created by the U.S. Fish & Wildlife Service. A portion of the city of Helena is seen in the lower right and the Fairgrounds race track is seen in the top - center. This is a draft map at a scale of 1:24,000 made in 1998 based upon an aerial photo taken in 1987. The wetlands have been drawn over the U.S.G.S. HELENA, MONTANA topo map.

Each wetland is labeled by initials. For example, PSSA represents Palustrine, Scrub-Shrub, Temporarily Flooded.

Riverine (R)	Water within a channel flowing either perennially or intermittently (rivers, streams)
Lacustrine (L)	Water in a depression, generally >20 acres (lakes)
Palustrine (P)	Water in a depression, generally <20 acres and less than 2 meters (6 feet) deep (small lakes, ponds, marshes, wet meadows)

Systems are further divided into "subsystems" which describe major hydrologic characteristics. The riverine subsystems are intermittent, lower perennial, and upper perennial. Lacustrine subsystems are limnetic (water >6 feet deep) and littoral (water <6 feet deep). Palustrine systems do not have subsystems.

Subsystems are divided into "classes" which describe whether a wetland is dominated by vegetation or unvegetated substrate. If the wetland has greater than 30% plant growth (e.g. cattail or willow), then a vegetated class is used (e.g. emergent or scrub-shrub, respectively). If the wetland is less than 30% vegetated (e.g. mud, sand, gravel) then the substrate determines the class (e.g. unconsolidated shore or unconsolidated bottom).

Table 1. Quick Cross Reference of Map Codes to Common Wetland Types in the Helena Valley (using System, Subsystem, and Class)

Map Code	Common Name or Wetland Type
	Palustrine
PEM	Emergent marsh, wet meadow, slough
PAB	Pond with floating or submerged aquatic vegetation
PUS	Wetlands with exposed substrate
PUB	Pond with open water
PSS	Shrub wetland, short, woody vegetation adjacent to streams
PFO	Forest wetlands, tall woody vegetation adjacent to streams
	Riverine
R4SB	Intermittently flowing water in a stream channel
R2UB	Slow moving perennial river with a floodplain (e.g. Tenmile Cr.)
R3UB	Fast moving perennial river with no floodplain
R2US	Bank or sandbar of slow moving stream
R3US	Bank, cobble/gravel bars, point bars of fast moving streams
	Lacustrine
L1UB	Deepwater zone of lake (e.g. middle of Lake Helena)
L2US	Lake shoreline or shallow water zone of lake
L2AB	Shallow lake with submerged or floating plants

Cowardin et al. (1979) provides many modifiers to further describe wetland features. Perhaps most important of these modifiers are the "water regime modifiers." Water regime modifiers are defined in terms of the growing season and qualitatively describe the general length of time water may be expected to exist in a wetland. Natural or man-made modifications (excavated, impounded, diked, partly drained, farmed, and artificial) were also mapped..

NWI maps provide an excellent source of general wetland locations, boundaries and characteristics. However, as stated on each NWI map, NWI maps are not a substitute for on site specific investigation when detailed information is required.

WEST SIDE WETLANDS - FAIRGROUNDS AREA

At this point in the process, the 1:12,000 color infrared photos, having been registered into a seamless, accurate image, and overlaid with the NWI wetland information, were ready for field testing. The project lacked the resources necessary to physically visit the entire land area under investigation. Sample areas were chosen, based upon the completeness of all layers of information in the summer of 1999. An area immediately west of the City of Helena, which was part of the study area was chosen for closer examination. This area includes the alluvial aquifers and floodplains of Seven Mile and Ten Mile creeks and an associated mosaic of shallow groundwater areas, all of which exhibited an array of wetland types. This complex generally lies between Mount Helena and the Scratchgravel Hills and extends East-West from the Fort Harrison Military Reservation to the western edge of the large, gravelly placer tailings deposit south of the city.

Westside History

Since earliest settlemment of Helena, this area was undergoing a temporal range of urban development -- the local fairgrounds had a history of wetland filling dating back prior to 1870 and a new housing subdivision was being placed upon wetlands during 1999. These activities have converted and fragmented the wetland habitats which were present prior to 1870 -- beginning with fill activities at the Fairgrounds. The railroad system was built through this area and split into two routes (west and north). The berms on which the railines sit were placed on wetlands. This had the effect of blocking the southwest to northeast trending surface water flow along the Tenmile floodplain and associated wetlands as well as interrupting or retarding subsurface groundwater flow.

The best documents we have located to help describe the history of this site begin with a portion of the Surveyor General's 1868 survey which is followed by U.S. Geological Survey (USGS), maps published in 1899, 1950 and 1985. USGS topographic maps are not intended to serve as a comprehensive record of all changes in an area, however, these maps illustrate general large scale changes to an

area which usually reflect human activity in an urban setting and have helped us understand activities which have affected wetlands.

The next four map segments illustrate specific changes to the landscape due to progressive devlopment over time in the Fairgrounds area.

1868 Survey

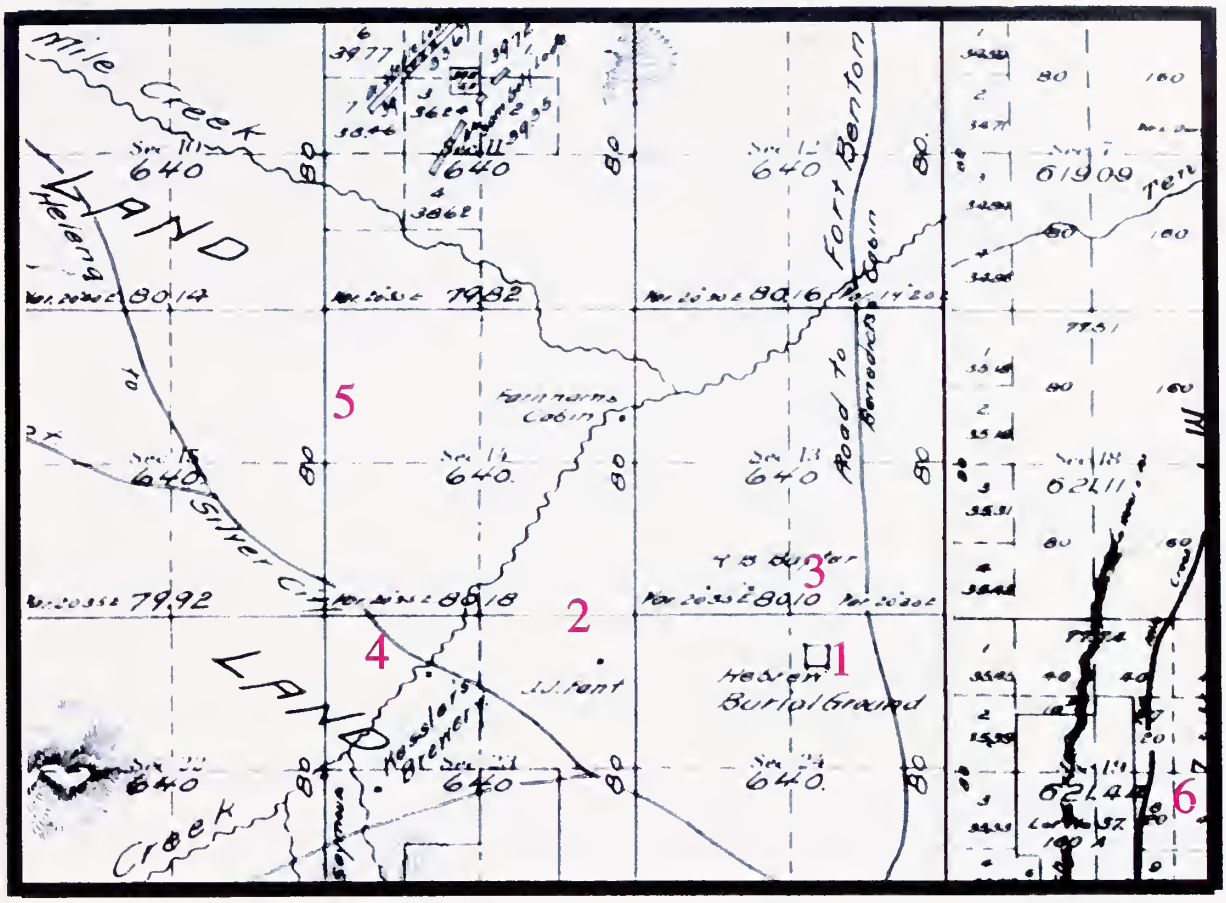
The history of the area West of Helena begins with the 1868 Survey. These early surveys resulted in unique, hand drawn maps which seemed to reflect the preferences of different surveyors and cartographers. The representation of elevational changes differed in techniques of sketching hills and ridges by use of lines drawn up slope. Most water courses were represented as a single line rather than attempting to define flood plain and riparian vegetation and wetlands.

One of the more enduring landmarks in this area is the Jewish Cemetery which is shown in the northern portion of Section 24 an a small square area labeled as the Hebrew Burial Ground which we have designated as site #1. The Section line dividing Sections 24 and 13 was yet to be developed into today's Custer Avenue (#2), the construction of which will necessitate much wetland filling. Today's Lewis and Clark County Fair Grounds have not yet been built upon the large deposit of fill material which will appear on R.B. Baxter's land in the southern half of Section 13, (#3). The creation of the fairgrounds closely coincides with the construction of the rail road which will extend by #2, through #5 and on westward. The construction of the railroad will represent a massive wetland fill and will also result in the realignment of surface watercourses in the area. The #4 in the 1868 map designates the Helena to Silver City road which will continue in use and eventually become Country Club Avenue which will evolve into a major wetland fill area to provide a firm elevated roadbed above the wetlands it crosses.

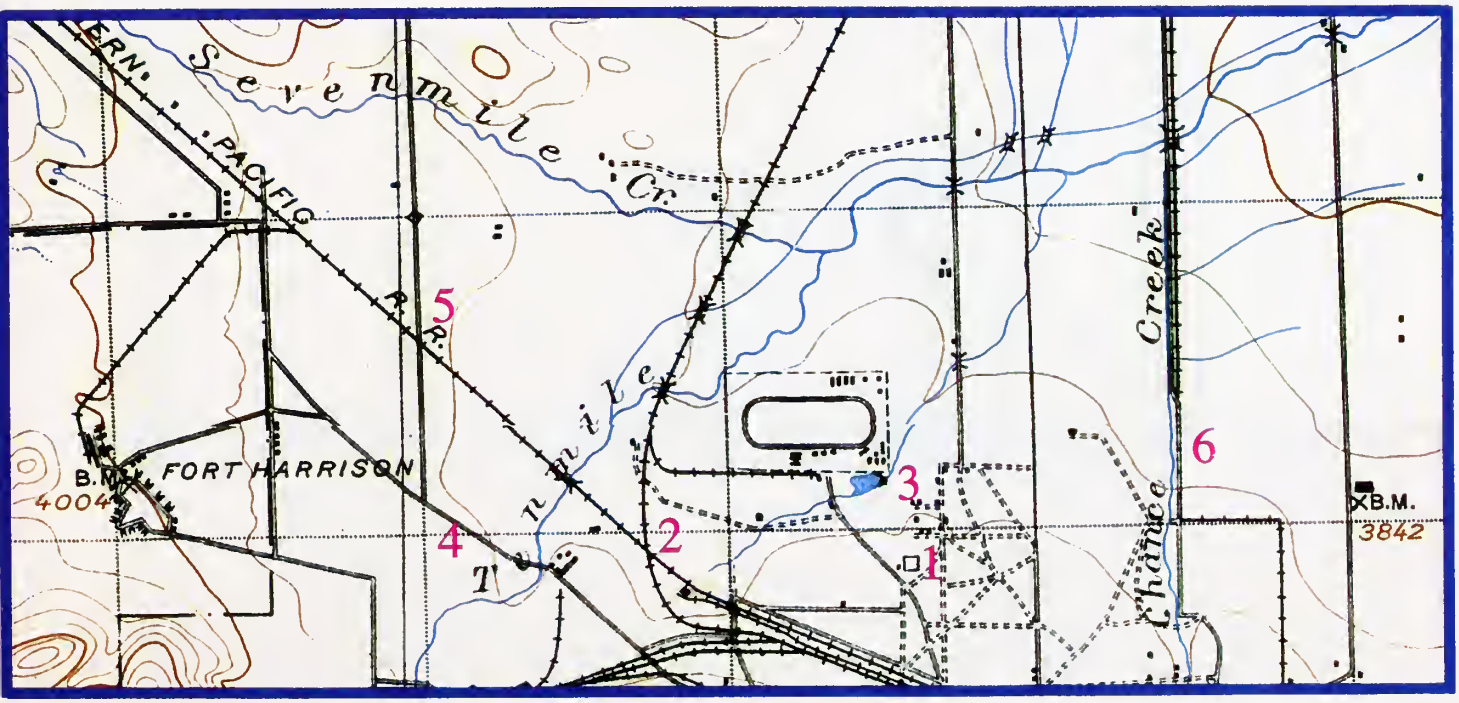
1899 USGS Map

Thirty two years later illustrate a City of Helena which has undergone considerable growth. Both Ten Mile and Seven Mile Creeks appear to have water diversions for irrigation and a rail road spur has been built into the fairgrounds. Last Chance Creek, shown as #6 continues to be an open surface water and seems to also be modified for irrigation and straightened to allow adjacent road and railroad construction. On this map the Jewish Cemetery has lost it's label, but the area remains as a square drawn on the map (#1). The fill material used to create the fairgrounds has caused the creation of a year round stream and pond in an effort to divert water around the south side of the fill used to elevate the race track and adjacent buildings. Ten Mile Creek continues to be shown as a singular watercourse as it extends under Country Club Avenue, (#4) and both the westward and northward rail road, (#5).

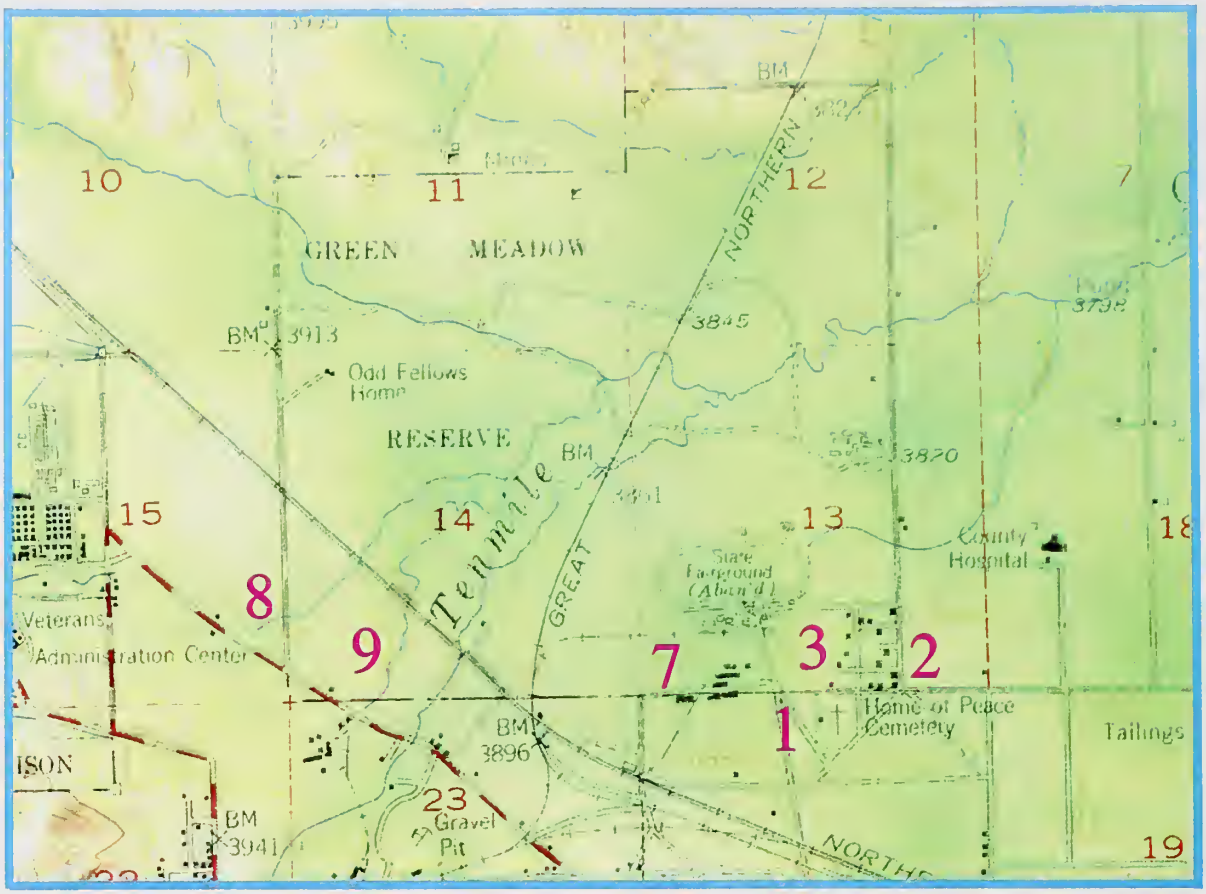
HISTORIC MAPS OF HELENA



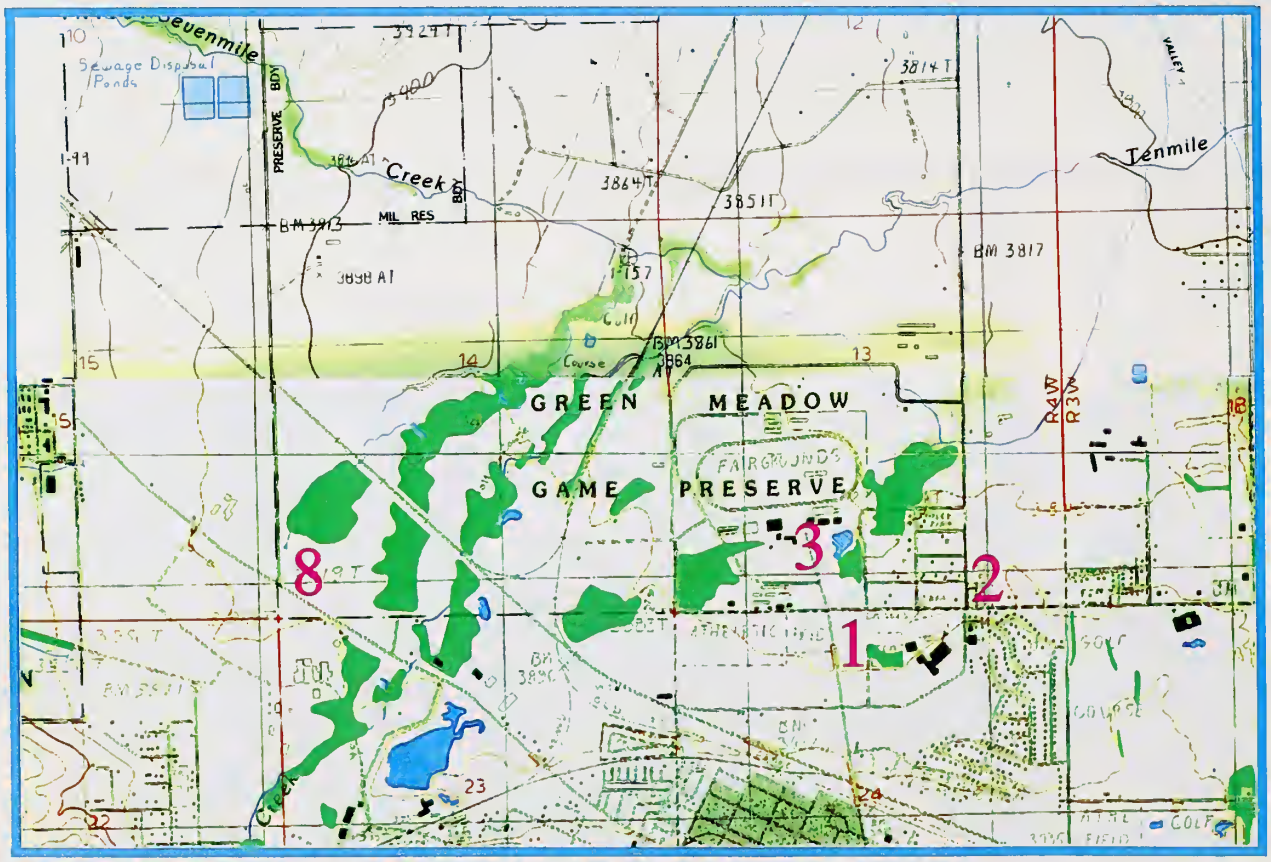
A Portion of the 1868 Survey of the Helena Valley. U.S. Surveyor General



U.S.G.S 1899. Helena Mont. Topographic Map. Contour Interval: 50 Feet (Enlarged)



Map: U.S.G.S., Helena, Mont. 1950. From an aerial photo taken in 1947. Scale was 1:62,500, contour interval is 40 feet. (Map has been enlarged)



Map: U.S.G.S., 1985, Helena, Montana - Scratchgravel Hills and Helena Quadrangles (combined). Contour Interval 20 ft.

1950 USGS Map

Last Chance Creek, (#6) has disappeared underground and has been isolated from the aquifer which it was supporting; the water is now being exported to a site North of town by underground pipe. The fairgrounds, which is shown as abandoned has lost it's pond and there is a change in the drainage on the East end. This change is beginning to look like the outlet of an organized underground drainage system. The Jewish Cemetery is now labeled as the Home of Peace Cemetery. Homes are being built just East of the fairgrounds, some of which probably require wetland fill and improved drainage along their Western boundary. Custer Avenue, (#2) is now in place and has wetlands on both the North and South sides of it's fill. Out #7 designates another rail road spur entering the fairgrounds from the Southwest along with the fill material it requires, (this area will evolve into a complex of elevated baseball fields and flood control excavations). Our #'s 8 and 9 indicate the appearance of two new surface watercourses, which may be the product of a combination of drainage excavation and groundwater changes due to fill materials and culverts related to Country Club Avenue, Head Lane (at #8), and the rail road. On this map, most of the elevations below the 3880 contour line are primarily wet and in a westward direction, wetlands extend generally just beyond Head Lane.

1985 USGS Map

This map is a provisional edition which has hand written titles and drawing used as a step in map revision, and the coloration provides less clarity and contrast. However, there are still valuable observations which can be made concerning water resources in the area. The area of the Jewish Cemetery has continued to undergo modification on it's East and West side with the completion of athletic fields and the construction of Capitol High school. The fairgrounds fill material has been extended southward to improve the large parking lot and a new duck pond has been provided as a part of the improved underground drainage system. The drain channel which emerges from under the east end of the race track is now joined by a new channel from the north which now drains a developing area of scattered housing to the north. The Fairgrounds is operating again and the enlarged Custer Avenue wetland fill which begins at about #2 extends Westward to the entrance road (Henderson Ave.). The rail road tracks have been removed from the fairgrounds and their elevated fill material have blended into the general filling of the area. At #8 the improvements on Head Lane have allowed road-side-ditch work that has increased the wetland drainage in the area and the upper portion of the related channel on the 1950 map has disappeared. Also the channel shown as #9 on the previous map has lost it's year-round water, but the place where it extends under the rail road remains a thriving wetland with open water. The largest change recorded by the 1985 map is the creation of the Green Meadow Country Club Golf Course. The hand written notation of "Golf Course" appears along Ten Mile Creek and represents a large wetland fill extending northeast, beginning at about Country Club Lane and extending over half a mile beyond the rail road.

West Side Wetlands - Current Conditions

A portion of the scanned and rectified set of color infrared photos taken Sept. 2nd, 1998 was chosen for illustrating this area. The U.S. Fish & Wildlife Service, National Wetlands Inventory for this area was obtained from their web site, (http://www.nwi.fws.gov) and is seen here in Graphic (W1) as blue lines superimposed on the background infrared photo image. The blue lines or polygons are the perimeters of wetlands as determined from the use of another infrared aerial photo taken in 1988 at a scale of 1:58,000. That photo was taken at a much higher elevation and would have necessarily covered a much larger area in the Helena valley. This scale would result in the loss of some detail which would be visible at a much lower elevation with a photo taken at a scale of 1:12,000 which is the case with the infrared image seen here. A better discussion of map and photo scales is found in Appendix B. It should be noted that the several photos which make up this image have been scanned (digitized) and resized to produce the format seen here. However, to allow an estimate of scale seen here we can use an object on this photo; the oval shape seen just to the right (west) of center is the racetrack at the local fairgrounds, the oval track is about 2250 feet in length. The race track measures 1.5 inches on this image and provides us with a scale of 1″ = 1500 feet.

The main hydrologic feature which relates to wetlands in the area shown here is Ten Mile Creek. The creek enters in the lower left corner and flows around the fairgrounds to the north and out of this area in the upper right hand corner. Over a long period of time, the creek has moved around and broadened it's floodplain and has left remnants of other channels it occupied previously. These older depressions continue to be occasionally flooded or be recharged with water during periods of high ground water, or they are close enough to the ground water surface to support wetland vegetation.

The profusion of blue polygons in the left part of the image indicates an area of nearly continuous wetlands which runs parallel to the current channel. The current channel is a light blue line;much of which is now surrounded by the Green Meadow Country Club Golf Course, the other blue line entering from the top of the image is Seven Mile Creek.

Another series of wetland polygons extends eastward from the creek and runs across the area south of the race track. Both of these series of blue polygons represent areas previously occupied by surface waterways which excavated channels, remnants of which remain wet. It is probable that the creek has moved back and forth across this area numerous times and that over long periods of time wetlands have been formed throughout the area.

The following photo images will be used to illustrate large scale filling and draining of wetlands such as that seen at the fairgrounds and the golf course which is just to the right of center in this image. Using these images and field observations

we can discover much more wetland area than that which is indicated by the blue polygons.

Graphic (W2) Illustrates the general location of soil types which are associated with wetlands in this area. There are two shades of green used here; the darker green represents hydric soil units. The lighter color "Nonhydric Soils with Hydric Inclusions" represents a combination of wetland and non wetland soils that are mixed and whose boundaries may be difficult to map.

The shape of the darker green hydric soils area conforms well with the row of blue wetland polygons which extend north of the fairgrounds. The more concentrated hydric soils are found in closer proximity to the current stream channels of both Ten Mile and Seven Mile Creeks. The location of the golf course within this soil unit may not conform to current conditions since the soil materials more recently used to fill the floodplain to create the golf course may not be hydric soil. Rather, the map describes the soil conditions at the site before many of the landscape changes created by man such as the construction of the golf course.

The lighter green areas delineate earlier locations of surface water activity such as Ten Mile Creek and offer a much larger area of potential wetland habitat than that which is shown by the NWI blue polygons. Except for a small area just north of the Archie Bray complex, the boundaries of these soil types are largely inclusive of the wetlands found within this area.

This soils information is designated as "provisional" by the Natural Resource Conservation Service and has not yet gone through all of the stages of preparation for publication.

Graphic (W 3) Illustrates the general location and direction of wetland drainage which is taking place through surface ditches and underground pipes or tiles. This graphic does not show all drainage which has been established for this area. It is expected that other drains may have been needed in the construction of the golf course and the houses and roads north of the fairgrounds. Only the larger of the known drainage efforts can be illustrated here.

Probably, the oldest drainage in the area was established with the construction of the rail road as it crossed the Ten Mile Creek floodplain and the underground tile which extends eastward under the oval racetrack at the fairgrounds. The underground drain shown on the right side of the image was not constructed to be a drain originally; it was a sewer main which has since been abandoned and now carries local ground water.

Green arrows were not used to designate natural stream channels except where they were either modified to facilitate wetland drainage or served as an element in an

artificial drainage design; such as a stream which receives water from the underground system under the fairgrounds. The drainage from Spring Meadow Lake (an artificial lake) was excluded and none of the Helena storm water system is included.

Any natural waterway which is operating in a normal state of equilibrium with surrounding ground water and wetlands should not be designated here. The use of the green arrows is primarily to show landscape modifications which have been done to diminish local ground water and wetlands.

It is difficult to quickly quantify the effects of individual landscape changes upon the natural functioning of wetlands. Where large transportation corridors extend across wetlands occurs, fill material is necessary to elevate roads and railroads enough to be dry and stable. The fill material is like building a dam; it modifies surface water (through narrow culverts or bridges) and the weight of the fill compresses the underlying aquifer and may change ground water depths and flow patterns. In this area Country Club Avenue and the rail road both cross the Ten Mile Creek floodplain and both facilities have been repeatedly improved or expanded over time. Today, the impacts of transportation facilities upon wetlands is being reduced through changes in design and construction such as permeable fill, elevated roadways and more bridges and culverts.

Graphic (W 4) Generally illustrates areas which currently show wetland characteristics. This mapping of wetland characteristics was done through specific site visits and observation form roads and railroads as well as examination of aerial photographs. Not every location was visited. For convenience, lines were drawn around wet areas which sometimes had inclusions of drier, upland vegetation and less soil moisture. However, the graphic was designed to illustrate the best approximation of wetland characteristics which existed in early September of 1998, when these aerial photographs were taken.

It should also be understood that the background infrared image is largely influenced by the reflectance of infrared light by vegetation. The brighter red the color, the more intense the reflection. The reflective character of the vegetation is increased when plants are healthy, have abundant water and have not yet experienced a frost. A During the drier part of the local growing season, wetlands will usually stand out on an infrared photograph, making them much easier to define. However, well watered agricultural or urban vegetation will also stand out and must be accurately identified by someone familiar with the local landscape.

This image has a bright red round area in the upper right corner which is an irrigated agricultural field. The golf course is a bright color due to regular watering of the grass as are some of the agricultural fields on the left side of the image. Within the yellow areas designated as wet, some of the lighter colored sites will be

seasonal wetlands which begin to dry out at the end of the growing season, or may have been recently mowed as a hay crop.

The lower elevation aerial photographs have allowed a more detailed image of the landscape and better determination of wetland characteristics. This map is not intended as a formal delineation of wetland boundaries. Any specific site should be visited by someone with experience in wetland delineation before an accurate description of a wetland can be relied upon.

Graphic (W 5) uses a blue overlay to indicate areas which have a high probability of being filled wetlands.

The major transportation corridors:
1. the railroad, both the west bound and north bound tracks crossing the Ten Mile and Seven Mile Creek floodplains.
2. Country Club Avenue in the south west corner of the area crosses Ten Mile Creek floodplain running parallel to the rail road
3. Head Lane, a north-south roadway connecting the rail road and Country Club Avenue on the left side (west) portion of this image.
4. Custer Avenue just south of the fairgrounds complex.

The major area fills:
1. The fairgrounds; fill began with the elevation of the race track and the two rail road spurs (1860's) and later extended south to establish more building sites and parking areas.
2. Green Meadow Country Club Golf Course filling was necessary to elevate the level playing surface above ground water and seasonal flooding.

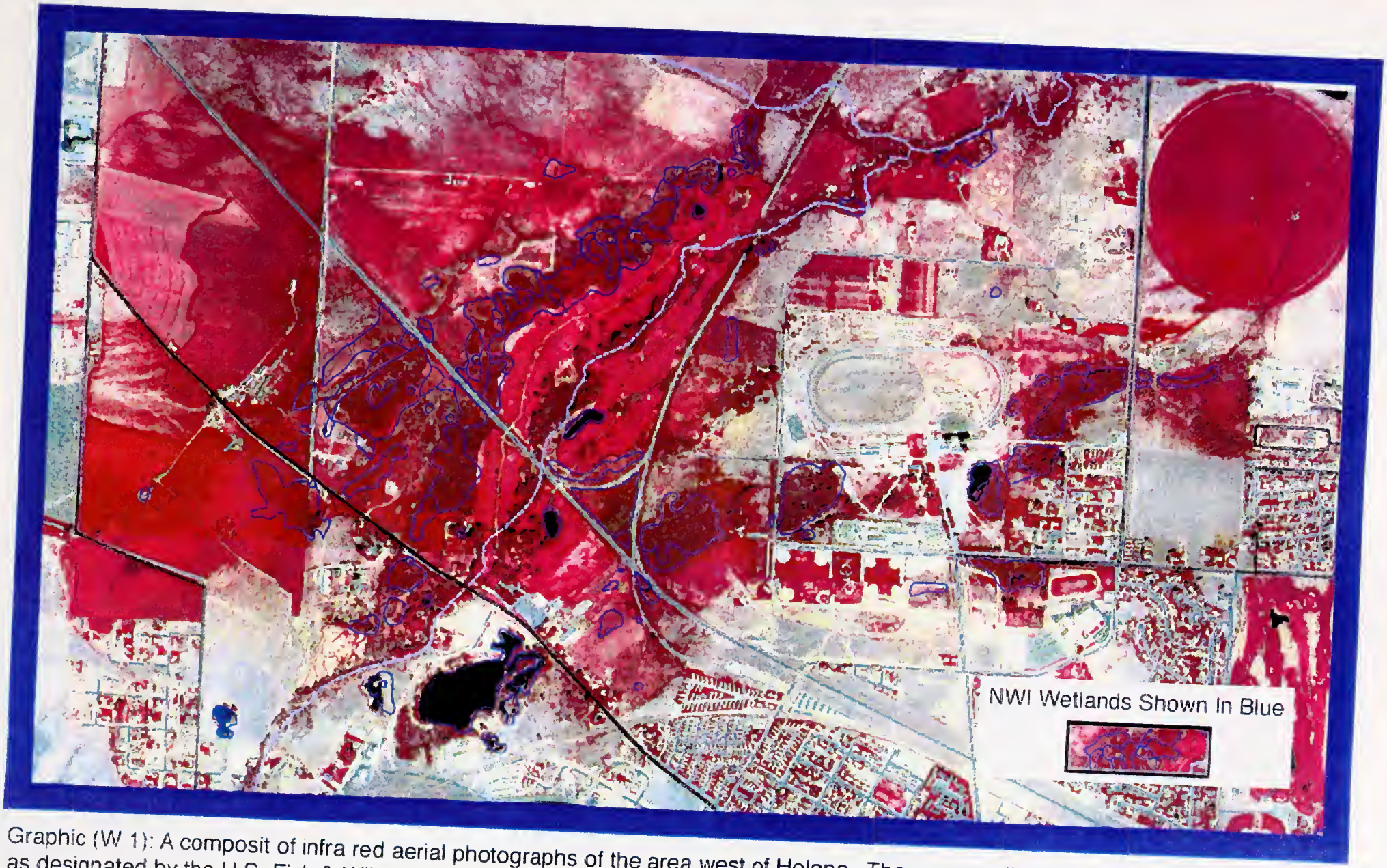
Other roads and agricultural areas are indicated which would represent intermittent fills of lower volume. No attempt was made to map the residential fills north of the fairgrounds, but the filling project in the new subdivision (far right) was taking place during field work for this project and was documented. This fill is adjacent to filling which was done to construct a county vehicle maintenance area immediately north of the housing development.

The housing development and the Capitol High School track, south-east of the fairgrounds complex are placed upon a transitional site which would probably be a mixture of upland and wetland.

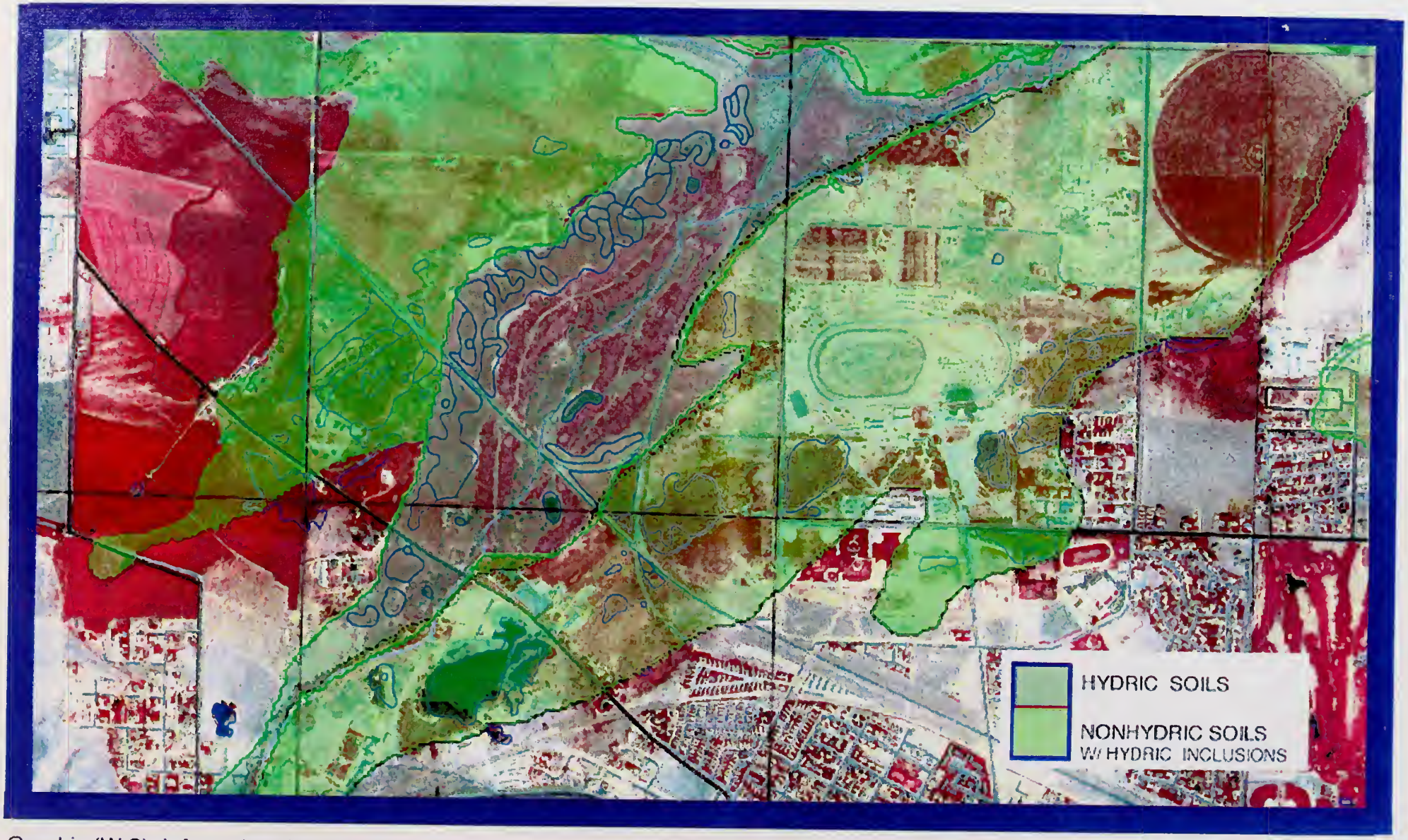
While incomplete; this illustration gives examples of the types of wetland modifications or losses which are typical of urban development. This process continues as land becomes more valuable it becomes economically feasible to address the physical challenges of building on wetlands and eventually all of the

resource is converted. This is a normal function of the local land market in the total absence of planning.

Various efforts to build upon wetlands have resulted in housing development which, over time has provided evidence that wetland fill solutions are not necessarily permanent. Some local housing his now experiencing failure of septic systems and leaking basements. Many roads built upon wetlands experience long term increases in maintenance due to an underestimation of construction preparation needed at the site at the time of initial placement.

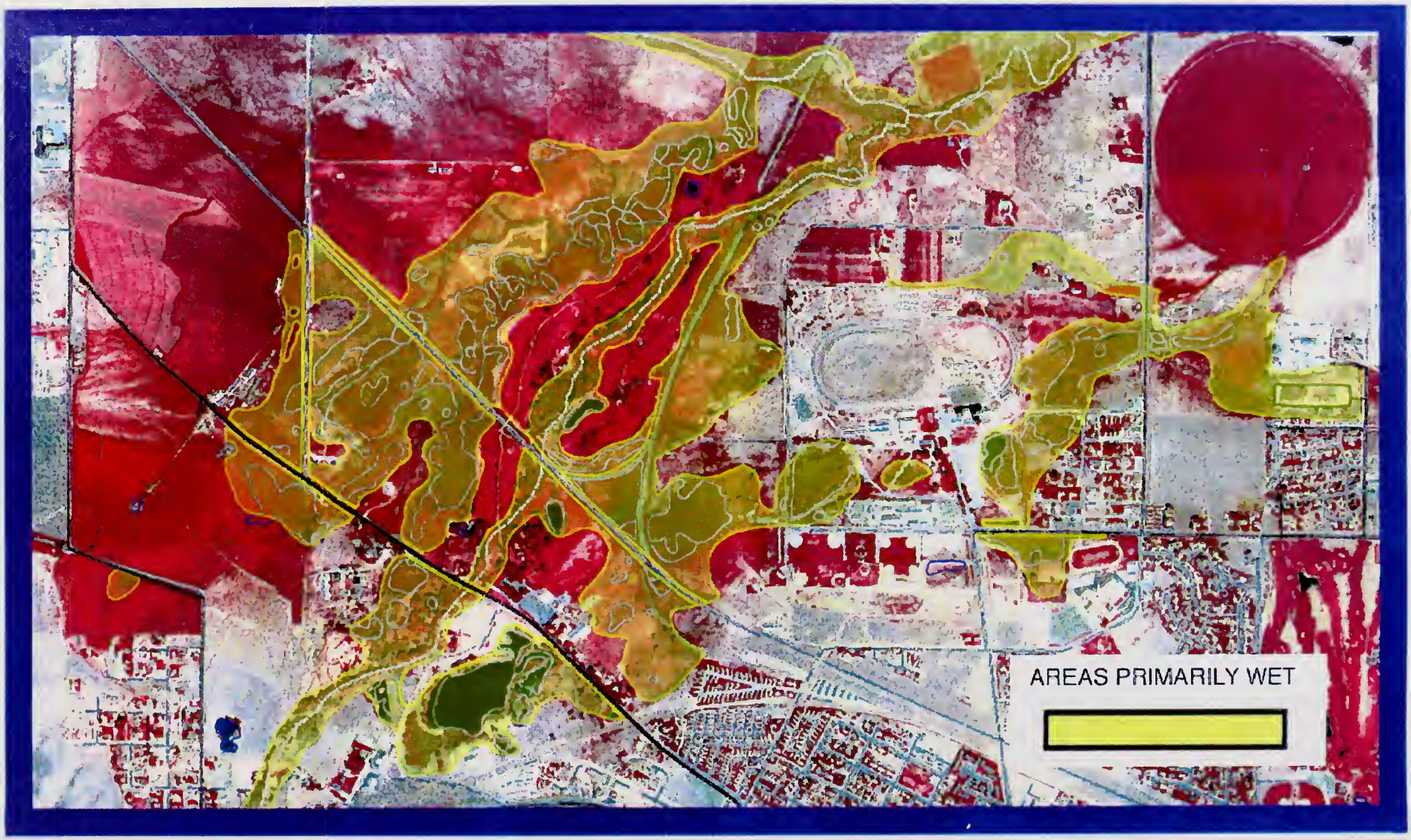


Graphic (W 1): A composit of infra red aerial photographs of the area west of Helena. The areas outlined by blue lines are wetlands as designated by the U.S. Fish & Wildlife Service National Wetlands Inventory. The photographs were scanned and the digital images were corrected (rectified) so that the images matched accurate survey data (from GPS) and the edges were overlapped to produce a seamless, accurate image. The National Wetlands Inventory (NWI) was downloaded from the internet as a separate layer of information suitable for use in the county Geographic Information System, (GIS)

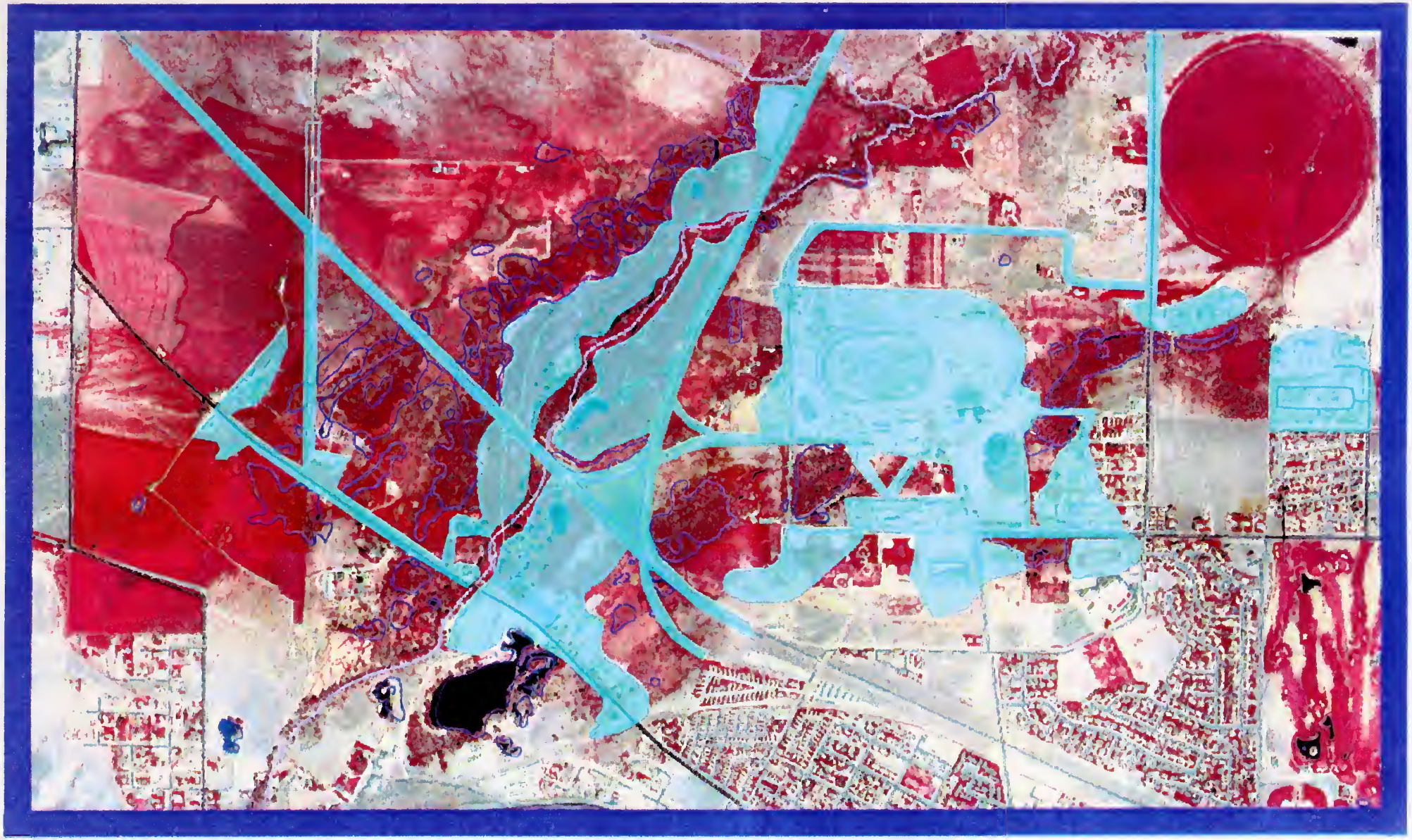


Graphic (W 2): Infra red aerial photographs of the area west of Helena overlaid with hydric soils information copied from a draft digital soils map provided by the Natural Resource Conservation Service (NRCS). The photo base is the same as used in Graphic (W 1). The NRCS soils information is an unpublished map which is unfinished. Much of the land area which was hydric soils has been filled and developed for roads, railroad tracks, farming and a golf course. The nonhydric soils with hydric inclusions have been filled to accommodate the county fairgrounds, farming, and urban growth (housing, roads, baseball fields, parks and flood control). Field investigation turned up some wetlands which were outside the areas designated by the color overlay seen on this map.

Graphic (W 3): Infra red aerial photographs of the area west of Helena with green arrows showing the location of drainage features which are draining wetlands and contiguous areas of shallow groundwater. Ten Mile Creek and the Helena storm drain system are excluded. Included are constructed ditches and channels which have been built to remove water from fill material used in roads, railroads and in some farmlands. All such wetland drainage features in this area are probably not included on this map. Water drainage is a good indicator of wetland and saturated soil conditions and these drainage features are shown to illustrate the presence of wetlands. The dashed green arrows show some of the known underground drainage facilities in the area, others are expected to exist.



Graphic (W 4): Infra red aerial photographs of the area west of Helena with a yellow overlay to show wetland areas determined through field inspection. This is not a formal wetland delineation; some of the areas within the yellow overlay will not be wetland and the yellow overlay does not include all wetlands. The area west of Head Lane and north of the rail road was not observed. Any areas shown as wetlands by the NWI survey (blue lines) which were not visited are included as yellow overlay here. Even with only a partial field inspection this graphic illustrates that soil maps and NWI surveys should not be relied upon for wetland mapping without inspection.



Graphic (W 5):Probable wetland fill areas are shown as a blue overlay. Only larger fill locations have been chosen and individual home sites have been eliminated due to a lack of detailed information and the scale of this map. Wetland filling began in this area on a large scale when the fairgrounds horse racing track was filled in preparation for the 1870 Montana Territorial Race and Fair. Wetland filling continues in the area with the latest project undertaken at a new housing development on Cooney Drive. Any filling done on a nonhydric soil may not necessairily cover a wetland depending upon site specific conditions.

EAST SIDE WETLAND HISTORY

To better understand the history of wetlands in the eastern portion of the Helena Valley it was necessary to visit the Montana Historical Society Library where we found reference to the 1868 Montana Territory Survey conducted by the Surveyor General's Office. This survey contained four townships which covered most of the Helena Valley and the eastern portion of the area of interest to this project. None of the original maps were available locally; a microfilm copy of the maps and the accompanying survey notes were obtained from the U.S. Government historical Document Archives in the Denver Federal Center in Denver, Colorado. Four of the Microfilm images were enlarged and converted to digital images and were combined to provide Graphic (EHA): Four Townships From The 1868 Survey Of The Helena Valley. Within these four townships there was only one area which was designated as a wet area with map symbols in a manner similar to a modern mapping convention. This area was found in Township 11North, Range 3 West and represents much of the lower elevation in the north-east portion of today's Helena Valley. The early surveyor drew tiny representations of marsh plants (grass-like) which covered about 3,600 acres of the depression. It is not surprising that this area is also the logical place of joining for Prickly Pear, Ten Mile and Silver Creeks as well as other minor watercourses which have since disappeared. It is not known whether early surveyors typically tried to display wetlands, however, the field notes which accompany these maps contain numerous references to the difficulties encountered in trying to conduct surface measurements in this area.

These surveys were conducted with primitive equipment and the resulting hand drawn maps were not constructed to make a good boundary match with each other. If you place any two townships side by side as we have done in Graphic (EHA) a roadway or stream channel on one map may not continue on the next map or may continue at another point which is out of alignment with the original map feature. While today's stream corridors have been encroached upon by various forms of development and as a result have lost significant riparian wetlands, it should be safe to assume that in the 1800's the riparian ecosystem was more robust in this location. However, there were no stream-related wetlands or any other wetlands shown on the early survey, we think, because there was no important environmental or economic value placed upon this resource.

Discussions with local landowners uncovered oral historical accounts of the wetlands shown in Graphic (EHA). According to these accounts, this extensive marshland complex had very soft bogg-like soils during the growing season which would not support large, heavy mammals such as buffalo or elk. However, during the winter months when the water would freeze, buffalo would migrate into the Helena Valley and venture out on the ice to consume the abundant annual growth of wetland plants remaining from the previous summer season. This winter migration to the winter range may have also attracted bands of Native Americans

who were dependent upon the wildlife for food and materials.

The next graphical representation of wetlands in the Helena Valley found in this survey is a map of "waterlogged soils" derived from field work done in the area in 1948 and shown here as Graphic (EHAB): Comparing 1868 Marsh with 1948 Waterlogged Soils. The original 1948 USGS map is included as Appendix C.

Beginning with the early increase in population in the Helena Valley, there was an increasing need for agricultural products and a growing optimism about the land's capability to provide crops such as sugar beets, (this optimism later proved to be unfounded as the random severity of the winter climate was better understood), which generated a need for more irrigated land area. Local farmers and ranchers developed water diversions in the Prickly Pear and Ten Mile Creeks and slowly expanded irrigation from those two stream corridors. Also, Montana Power began developing an early version of Lake Helena and built pumping facilities for moving water uphill for expanded irrigation. These earlier efforts to develop irrigation were done with minimal resources and were inefficient in several ways; (1) much of the topography was sloped and shaped in a way which made spreading of water less efficient, and
(2) ditches were built in permeable soils which allowed the leakage of water when they were in use.

All of the inefficient water losses and resulting increases in water use served to "charge" the aquifer and cause widespread elevation of ground water. This evolving situation, as it was studied and mapped in 1948 was described in a US Geological Survey publication in 1951 "Geology and ground-water resources of the Helena Valley, Montana." This publication referred to wet areas of shallow ground water as "waterlogged soils". The following are quotes from the study:

Page 39. WATERLOGGING IN THE HELENA VALLEY, <u>Present Conditions</u>
"More than 8000 acres of land either are unproductive at the present time or their productivity has been greatly decreased as a result of the high water table. Nearly the entire waterlogged area was formerly productive farm land, but now only parts of the area are suitable even for grazing. A small rise of the water table will probably take out of production even those lands now under marginal cultivation."

Page 41. SUMMARY AND RECOMMENDATIONS
"If water is brought into the valley, provisions must be made to prevent any appreciable rise of the water table under presently irrigated land. Drains that have a maximum depth of about 4 feet serve only to remove excess surface water and may do more damage than good.... Waterlogged lands can be rendered productive again only by lowering the water table to a depth below the land surface greater than the capillary fringe and maintaining it at that depth for the greater part of each year. In parts of the valley where soil materials are very fine grained the depth of the water

table should be 10 to 12 feet below the land surface. Subsurface (open or tile) drains of this depth may not be economically feasible in the Helena Valley because in addition to the great initial cost of construction the drains may require frequent and expensive maintenance and would take much land out of cultivation."
Any effort to study area wetlands should necessarily include a survey of wetland (hydric) soil types (note: Pam, describe hydric soils in the intro. section). Development of a true hydric soil is a geochemical process and requires a long time period. The evolving changes in land use which take place in a valley which is undergoing both agricultural and urban development are thought to be too rapid and short lived to establish hydric soils. Therefore, a traditional soil survey, (including hydric soils) is a source of important information when trying to understand the wetland history of an area as it extends back in time beyond recent activities The Natural Resource Conservation Service is the agency which provides us with local soils information, often in the form of a published local soil survey. The original survey for this area is outdated and a new one is in preparation. In the interim, a digital map of local soils in it's draft form is available, a portion of which is shown as Graphic (EHB).

To create this graphic, only a selected portion of the information was used. We concentrated on the Eastern portion of the Helena Valley which was central to the Bureau of Reclamation irrigation district, other smaller, isolated hydric soil areas were eliminated from this graphic, but should not be overlooked during any land use planning considerations.

While the extent of potential hydric soils shown here is vastly greater than that shown on the 1868 survey, the general area and it's boundary closely resembles the waterlogged soils as reported from the 1948 USGS study. All of the available information concerning the historical extent of wetlands is almost circumstantial, because there was no understanding for a need to accurately define and map wetlands during previous decades because this resource was not understood to be be both valuable and diminishing. The marshlands which happen to be mapped in the 1868 survey are not well defined and the waterlogged soils in the 1851 USGS publication are not defined as historical (natural) or man induced. Our most accurate boundaries may be found on the draft NRCS soils map; however the extent to which hydric soil inclusions occur in non-hydric soil units is not precise as to location or amount. It is therefore necessary to continue to seek out additional direct or circumstantial evidence to further improve upon the past wetland details at this location.

The map copied from the 1951 USGS publication and used here as Graphic EHAB represents information which was probably a useful resource for the Bureau of Reclamation (BOR) as they contemplated building the Helena Valley Irrigation District. Efforts to build dams and power generating facilities along the Missouri River cause a number of sites to be evaluated and dam builders wanted to list

numerous benefits expected at different possible dam sites. The proposal for the Canyon Ferry Dam site inspired the planners to also include the creation of a 15,000 acre irrigation district as an added benefit at this location. This proposal also included expectations of improved farming with better irrigation which was expected to allow more valuable cropping such as sugar beets.

However, one of the main obstacles encountered in planning a large irrigation development was the fact that this portion of the Helena Valley either contained significant wetlands or was suffering from increased "waterlogged" lands due to inefficient water distribution. The area had to be drained before it could be irrigated.

A very extensive and expensive construction project was designed to both drain and irrigate much of the Helena Valley through the creation of the Helena Valley Irrigation district. Part of this project is seen in Graphic (EHC): Bureau of Reclamation Map of Surface and Underground Drainage. The original version of this map also included the irrigation construction and other details of the area. Much of this information was erased to simplify the image and better present the drainage project. Semitransparent blue and orange color was used to highlite the drainage surface ditches and underground tile drains. The surface ditches are blue and are also represented by and the underground tile drains are represented by lines covered by semitransparent orange color. Most of the underground drains empty into ditches which eventually convey water down slope to Lake Helena.

The BOR drainage project is shown here because it is also helpful as another means of illustrating wetlands in the Helena valley. In this manner, wetlands, or shallow ground water areas can be illustrated through the efforts made to eliminate them through drainage. The drainage project was designed to both reduce or eliminate wetlands as well as drain excess soil water which was anticipated as a result of the operation of the newly constructed irrigation system.

We need to remind you that there are other wetland locations within this area which are not illustrated for the sake of simplicity. Because there are such interesting variations in the sequence of historical documents which either directly or indirectly describe the wetlands here, an effort was made to pare down subsequent information sources to allow an illustration of changes in the time line beginning with the marsh area seen in the 1868 survey. To allow us to compare local information, we have also overlaid some selected components from some maps to express changes which have taken place at the same location over time.

Another effort to overlay information sources for the sake of comparison is also seen in Graphic (EHD): BOR Drainage Over NRCS Soils. The BOR drainage project copied from Graphic (EHC) is represented by heavy grey lines as surface ditches and dashed lines as underground tile drains. The dark and light green background is a duplicate of Graphic (EHB).

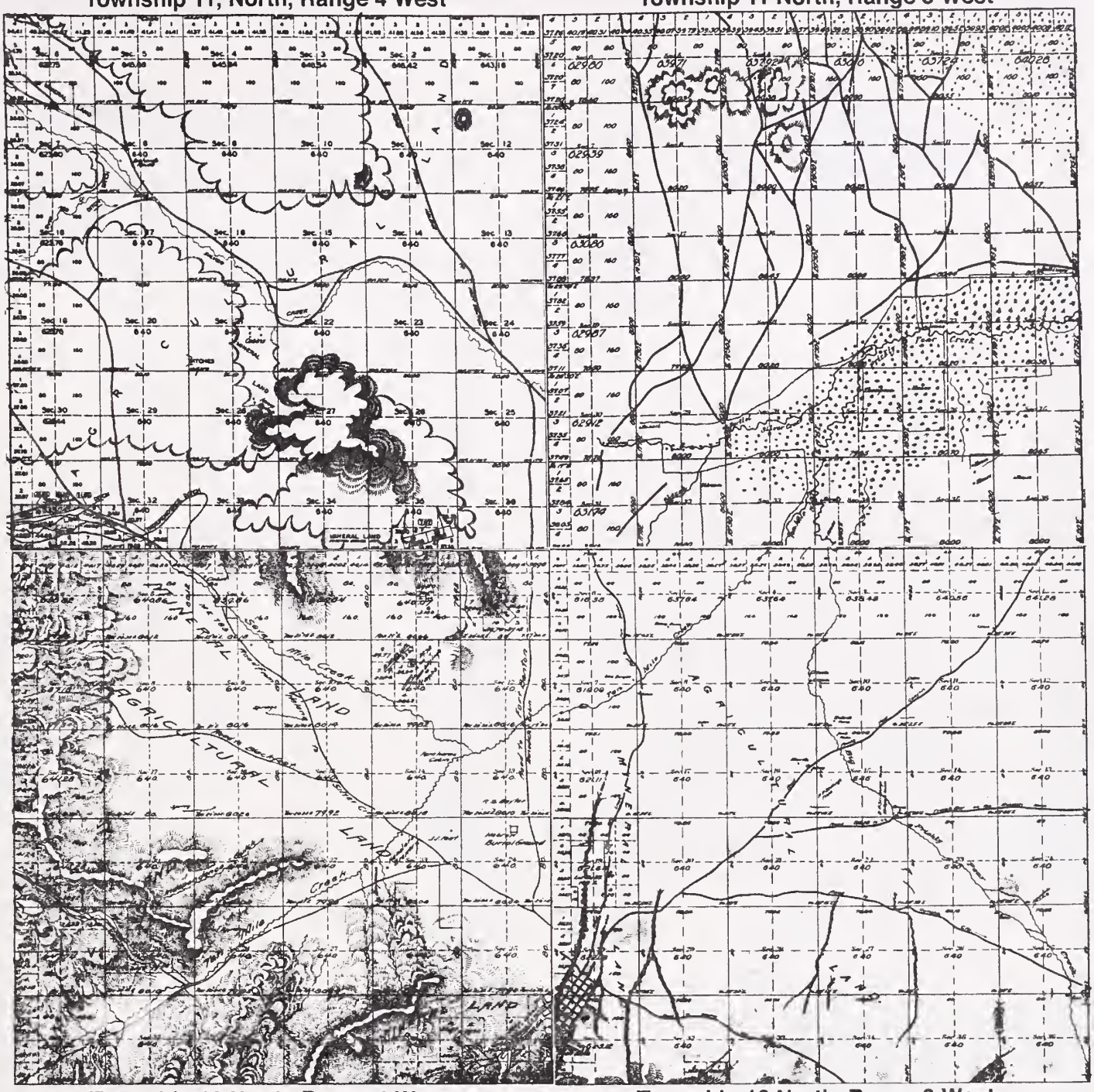
When overlaid, these images show the similarity between the area covered by hydric soils and the area which was determined to be in need of drainage. In this regard these images are mutually supportive and both assist in explaining the wetland history of this portion of the Helena Valley where a precise wetland map representing historical conditions is unavailable.

Because the chemical changes necessary to create hydric soils take such a long time to take place, it is probable that the soil map will outlive the wetlands when human activity is concentrated on draining the wetlands over a forty year period. The Bureau of Reclamation was not trying to dry out the local landscape; they wanted to establish better agricultural conditions. These conditions included reducing soil moisture sufficiently such that for at least part of the year the soil could be tilled and crops could be both planted and harvested. It may be hard to precisely evaluate the site-by-site success of the drainage project since the crops which it was intended to enable have largely been disallowed by climatic severity which was only gradually understood through the year-by-year accumulation of climatic observations.

There is no doubt that the drainage project has had a very big effect upon the wetlands in this part of the valley and it did improve availability of many areas for use in forage crop production using plant communities which were adapted to the long cold winters and short growing seasons. Reducing wetlands in an effort to improve agriculture does not mean that other, new changes in land use can take place without new conflicts with shallow ground water conditions. Efforts to urbanize the area and establish residential subdivisions have met with mixed success. As Helena grows, the valley becomes more densely populated and agricultural priorities slowly yield to urban needs. The local human population is urbanizing over the BOR wetland drainage project. This project was not designed to provide for the water management needs of housing development. Also, as the project ages it can be expected to break down or to be damaged by excavation. Where the drainage is rendered inefficient large scale ground water changes could occur in areas dedicated to business and residential uses. Managing these eventualities will require that the local county government will gradually assume responsibility for the drainage system and the related ground water; an expensive and complicated process which will require expanding tax payer support. These are important considerations which should be a part of economic decisions to eliminate or modify wetlands to accommodate development.

Graphic EHA: Four Townships From The 1868 Survey Of The Helena Valley

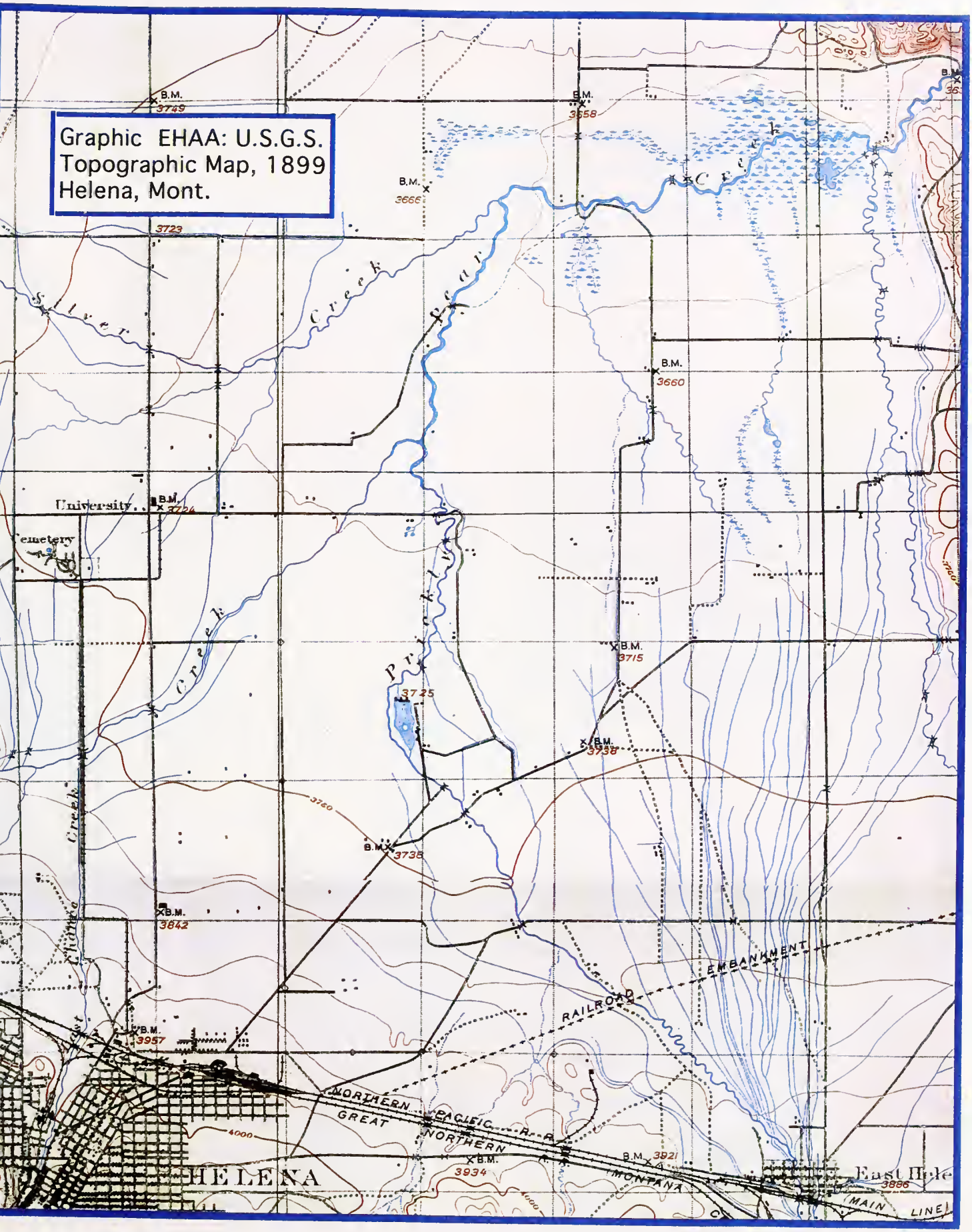
Township 11, North, Range 4 West | **Township 11 North, Range 3 West**



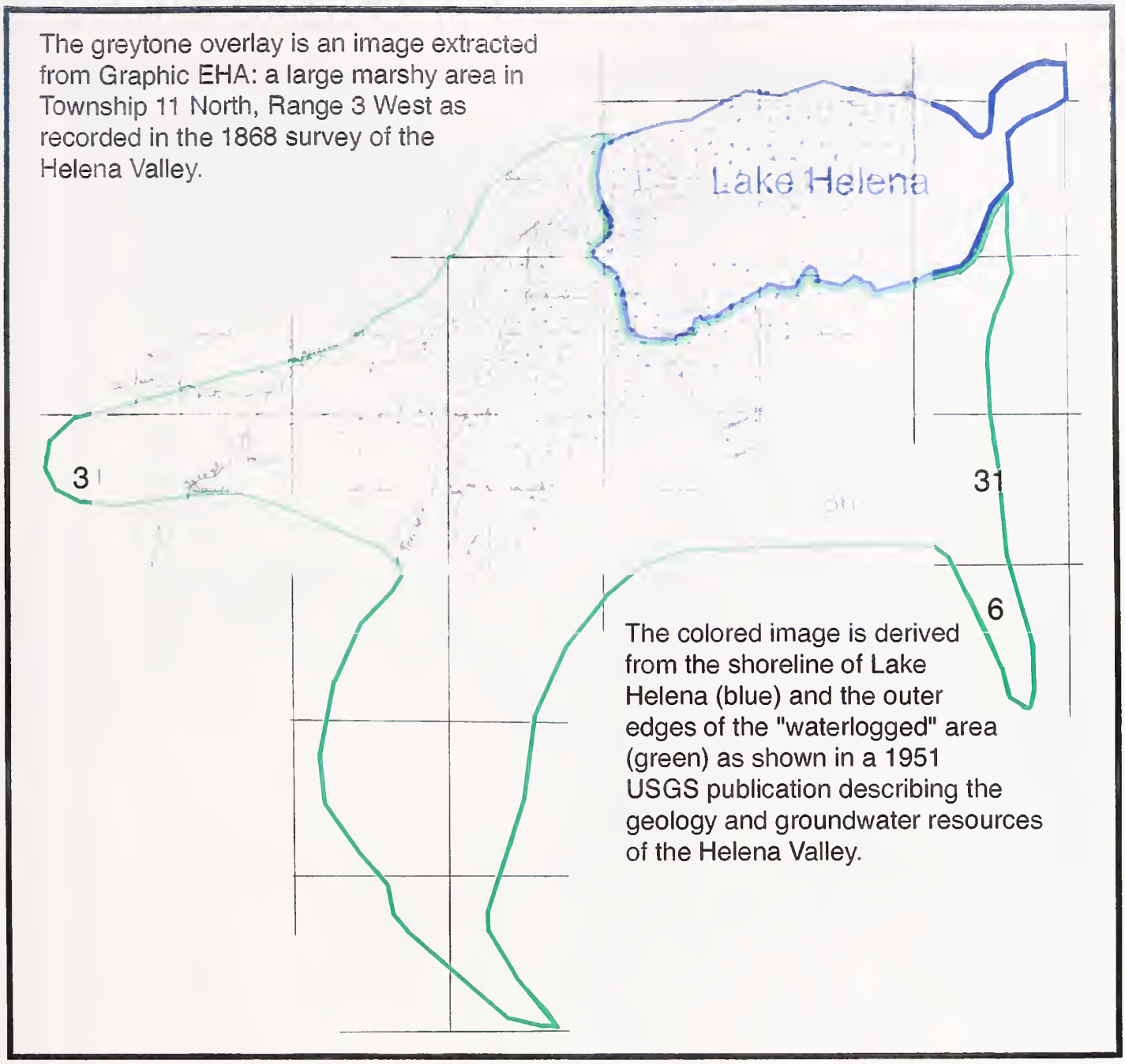
Township 10 North, Range 4 West | **Township 10 North, Range 3 West**

W.W. Johnson, U.S. Surveyor General's Office, Montana Territory, 1868 (Scanned from microfilm)

Four townships from the 1868 survey are shown above. Each township was surveyed separately; they were not intended to be connected into a larger image. Only one large area of contiguous wetlands was shown in T11N, R 3 W. This wetland area is at the convergence of Silver, Ten Mile and Prickly Pear Creeks (see the tiny marsh grass symbols). There was no lake at this location in 1868. While other areas in the Hena Valley are believed to have been wet, this is not shown on this survey.


Graphic EHAA: U.S.G.S.
Topographic Map, 1899
Helena, Mont.
Silver Creek
Spring Creek
Prickly Pear Creek
Chinese Creek
University
Cemetery
B.M. 3749
B.M. 3658
B.M. 3666
B.M. 3660
B.M. 3715
B.M. 3725
B.M. 3738
B.M. 3842
B.M. 3957
B.M. 3934
B.M. 3921
B.M. 3886
3723
3760
4000
EMBANKMENT
RAILROAD
NORTHERN PACIFIC R. R.
GREAT NORTHERN R. R.
MONTANA
MAIN LINE
HELENA
East Hele

Graphic EHAB: Comparing 1868 Marsh with 1948 Waterlogged Soils

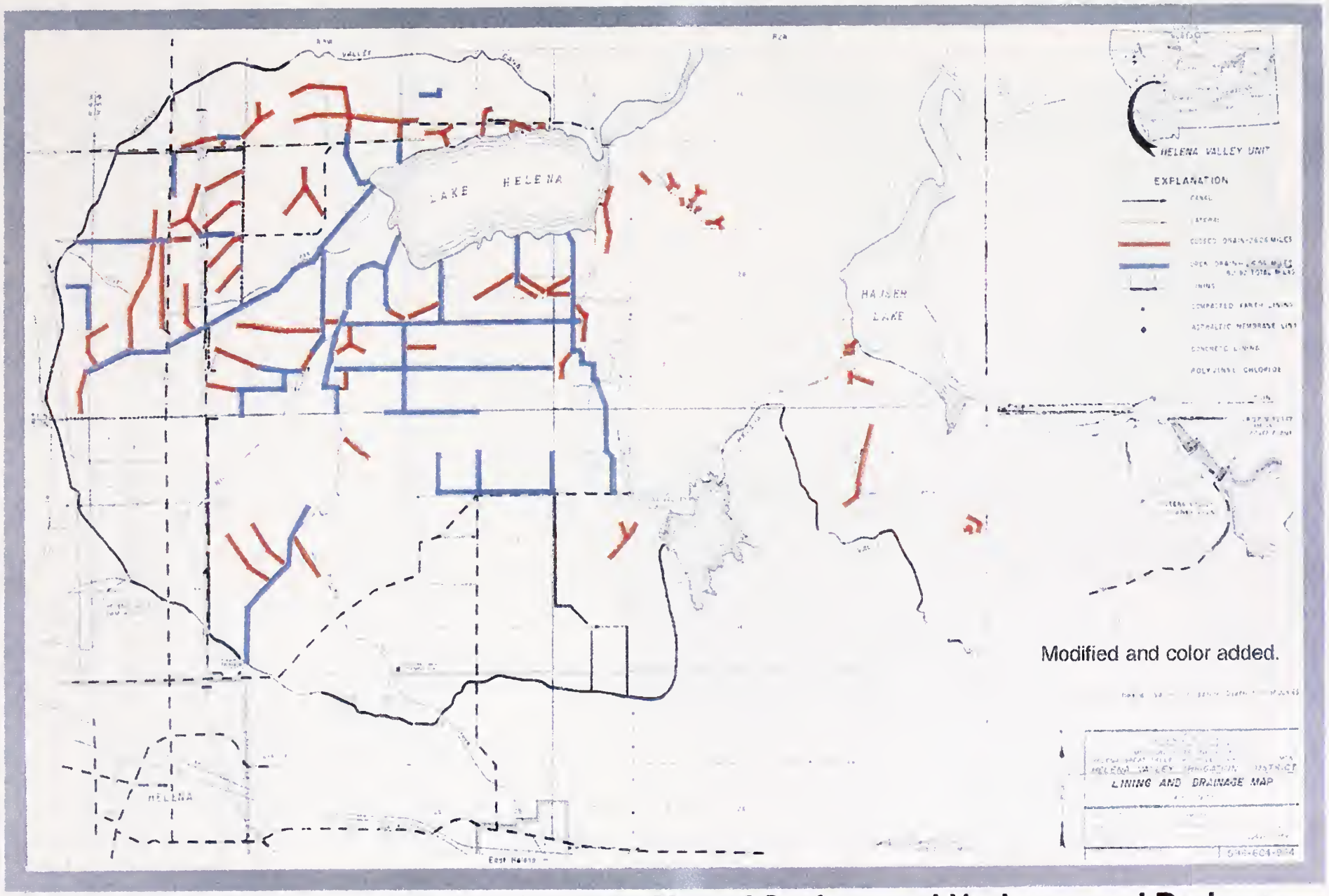


The 1868 Survey, partially overlaid here, copied from Graphic EHA, was a series of hand-made maps, made by different surveyors. The wetlands shown in T 11N, R 3 W with the small marsh-grass symbols appear to extend off of the right (east) side of the map. However, wetland symbols were not drawn on the next map, ie. the maps are not ment to match prefectly. This survey took place at a time before Lake Helena was established and before much irrigation had begun in the area. The marsh-grass symbols cover an area about 3,600 acres in size.

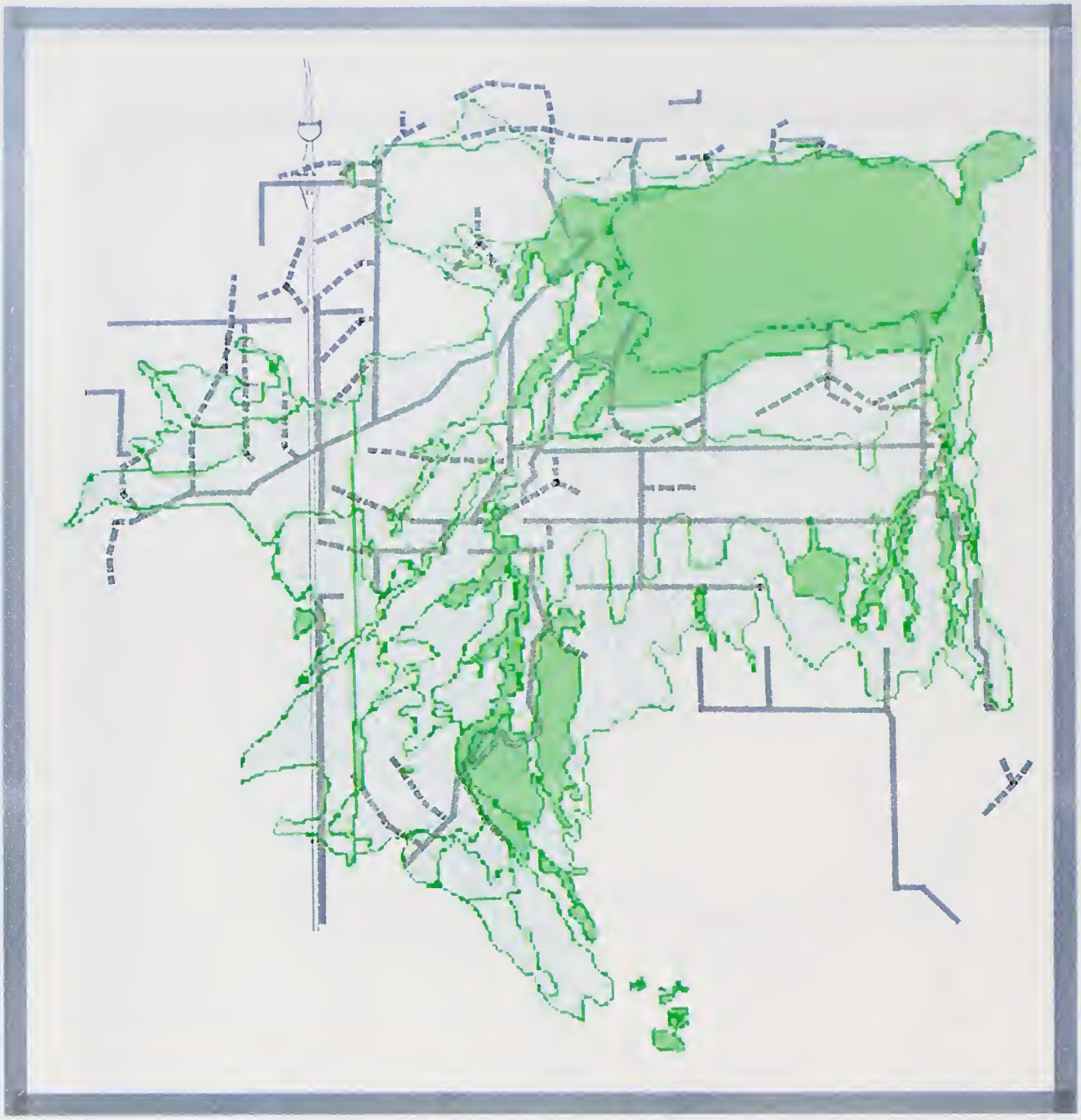
The blue and green image copied from the USGS study represents a time of irrigation development in the valley. The study states that extensive leaking ditches resulted in water from Ten Mile and Prickly Pear Creeks being widely spread; causing waterlogged soils. Because of changes in elevation of the surface, the area outlined in green probably contained different degrees of saturated soils and higher, drier areas not shown. The area within the green line is estimated to be about 7,800 acres. A copy of the USGS map is attached as Appendix C.

Graphic (EHB): NRCS Soils Map

This is a draft version of soil types in the Eastern portion of the survey area. For simplification, soil type names and numbers have been removed and all soil units that do not contain significant amounts of hydric, (wetland) soils have been eraced. Darker green areas are predominantly hydric soil units, lighter green areas are non-hydric soil units with inclusions of hydric soil types.



Graphic EHC: Bureau of Reclamation 1973 Map of Surface and Underground Drainage



Graphic (EHD) BOR Drainage over NRCS Soils

This is the same soils diagram as seen in Graphic EHB with an overlay of the Bureau of Reclamation surface and underground drainage system as constructed in the late 50's. With a few exceptions, the drainage array indicates a need to drain those areas shown as wet or potentially wet soils. Drains which extend beyond wet soil types indicate unmapped wet soils or areas in need of drainage due to excessive irrigation water.

Appendix A - Explanation of Infrared Film

The following is from Kodak publication AS-69., downloaded Nov. 9,1999, Steve Mango, Product Development Manager,C&GS Aerial Imaging, E-mail: smango@kodak.com

...the reflection from living vegetation in the infrared portion of the electromagnetic spectrum is very different from that in the visible portion. The energy of the reflection in the IR region is much higher, and consequently there are much greater differences between species in the IR region than in the visible portion, where they generally look similar. Water absorbs infrared radiation, so IR films are also used in hydrological studies and in mapping wetlands & coastal areas; water appears black in an IR image, hence the delineation between water and land is quite dramatic. To a great extent, this is true for water or moisture content of soils also.

Generally, in spring and summer, healthy deciduous trees photograph magenta or red, and healthy evergreens photograph brownish red. Dead or dying deciduous leaves or evergreen needles usually photograph anywhere from dark red to green or even yellow. The leaves of deciduous trees, which turn red or yellow in autumn, still retain some of their infrared reflectivity for a while. Consequently, red leaves may photograph yellow, and yellow leaves may photograph white. In any given vegetation, the season, the water and mineral content of the soil, and the age and health of the vegetation may cause its infrared reflectance to vary. In fact, the first sign of a distressed tree (or plant) is often a decrease in infrared reflectance, which frequently first becomes apparent in color infrared photography.

Color Infrared-Sensitive Films Any portion of the spectrum to which photographic materials are sensitive can be recorded in a color film if the individual emulsion layer is correspondingly sensitized. Furthermore, the color of the dye formed in a particular layer need bear no relationship to the color of light to which the layer is sensitive. If the relationship is not complementary, the resulting colors are false. False-color films can be used to emphasized differences between objects that are visually quite similar. Color infrared-sensitized films emphasize differences in infrared reflectance. Figure 1 is a simplified diagram that demonstrates graphically how the colors of the terrain are reproduced falsely on color infrared-sensitive films such as KODAK AEROCHROME Infrared Films.

As indicated in Figure 1, all three layers are inherently sensitive to blue radiation. Therefore, to limit the exposure of each layer of color infrared film to only its intended spectral region, a yellow filter (minus blue) such as a KODAK Filter No. 12 (or equivalent) is always used over the camera lens. It can be seen that with the yellow filter in place, the layers act as though they were sensitive only to infrared, green, and red (as all blue radiation is absorbed by the filter). The gray-screened areas in the top portion of the diagram illustrate exposed areas of silver halide in the

various layers from each of the spectral bands reflected from the original scene. Thus, three separate negative silver records are formed.

Where there is no exposure, the recommended reversal processing will yield cyan dye in the infrared-sensitive layer, yellow dye in the green-sensitive layer, and magenta dye in the red-sensitive layer. When an image is exposed, the amount of dye formed is inversely proportional to the exposure. The bottom portion of Figure 1 illustrates the dye formation and resulting colors after exposure and processing. Infrared radiation appears as red which is the result of yellow dye formation in one layer and magenta dye formation in a second layer and the absence of cyan dye. Green reproduces as blue—the result of cyan dye formation in one layer and magenta dye formation in a second layer and the absence of yellow dye. Red reproduces as green—the result of cyan dye formation in one layer and yellow dye formation in a second layer and the absence of magenta dye.

Blue in the original subject has not been recorded because of the filter and, therefore, is rendered as black. Numerous other colors will be formed, depending on the proportions of green, red, and infrared reflected or transmitted by the original subject.

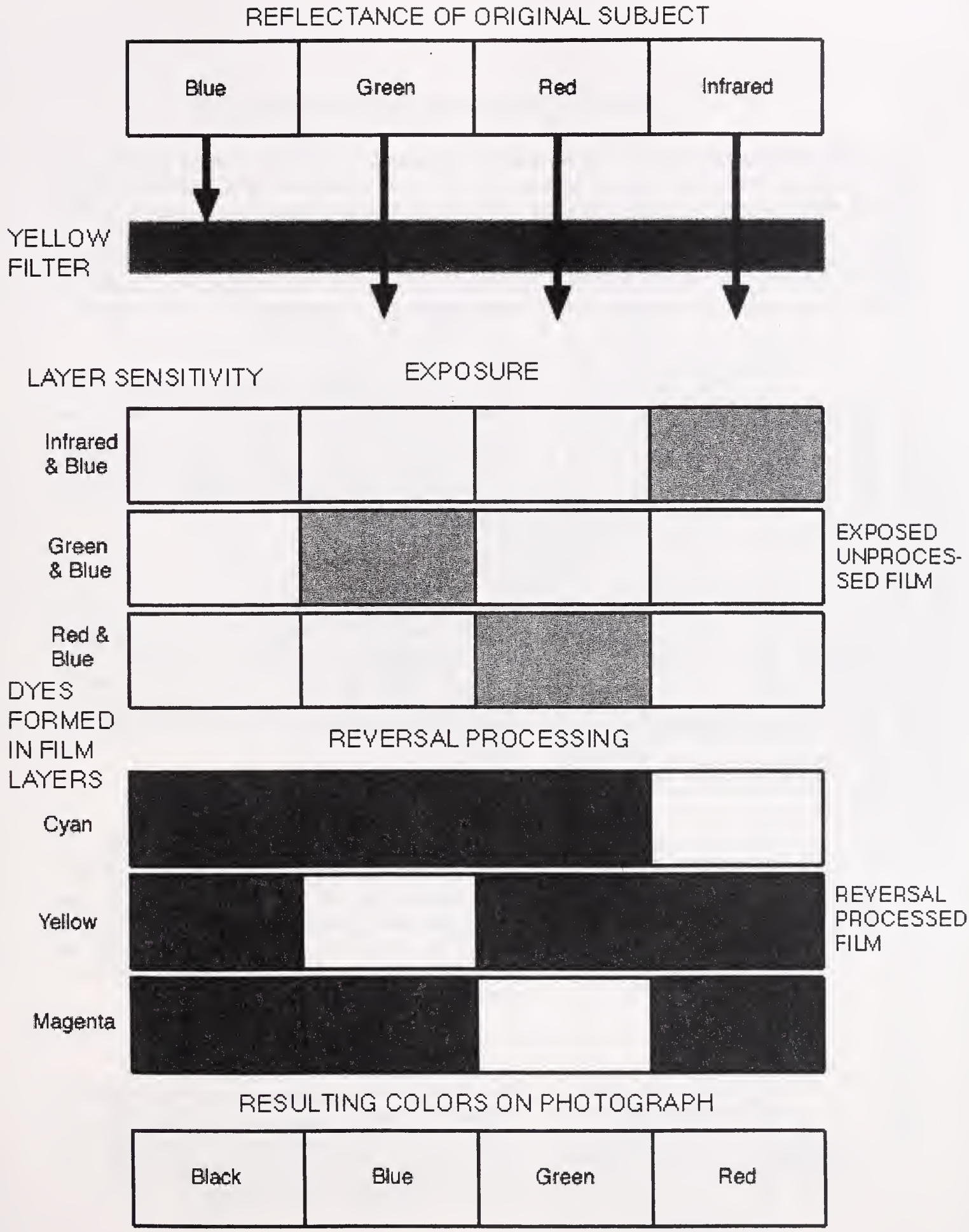
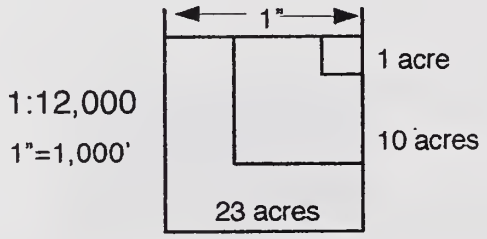


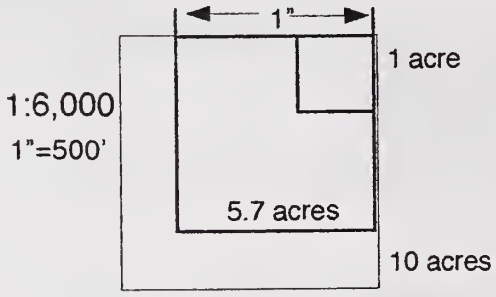
Figure 1. Color Reproduction with Kodak Aerochrome Infrared Films.
Adapted from Kodak Publication AS-69

APPENDIX B: MAP AND AERIAL PHOTO SCALES

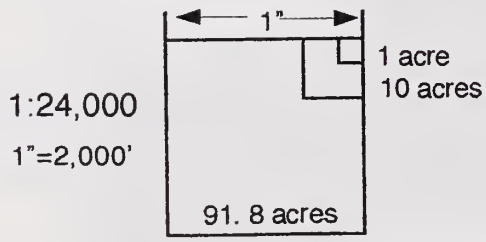
The scales shown here are commonly found as a format for maps and aerial photos. For each example we have drawn a square inch (1") into which we have inserted a small square which shows the size of one acre of land as it would appear on a map or photo. The next largest square shows the size of a 10 acre area, (note that the 10 acre area is actually larger than our one inch template at the scale of 1:6,000). We have also included a number in the bottom of the one inch template which represents the number of acres of surface which would be included in a one inch square if it were drawn on a map or photo.



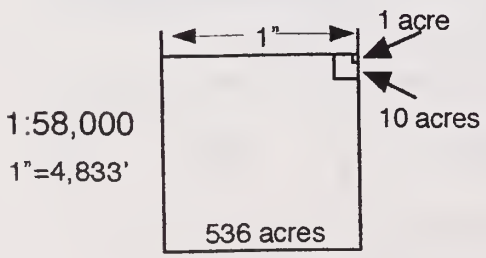
The 1:12,000 scale is what we chose for our aerial photography. We took 79 photos at an elevation of 6,000 feet above ground surface to cover our study area. These images can easily be reduced by 50% to fit the county GIS format which is 1:24,000.



The 1:6,000 scale is achieved by doubling the size of our 1:12,000 photos. This image is good for work sheets, ie. drawing the edges of wetlands and finding exact survey points used in our GPS work. The wetland vegetation appears as though you were suspended 3,000 feet overhead.



The 1:24,000 scale is used by the USGS for our local topographic maps. These base maps are also used by the USF&WS for the National Wetlands Inventory (see blue polygons). This scale is used by most GPS systems, it is not easy to record a wetland less than 5 acres in size on a map at this scale.



The 1:58,000 scale was used by the USF&WS for their wetlands imaging in the Helena Valley. While this scale requires fewer photographs, it is more difficult to accurately locate boundaries or smaller wetlands on these images.

APPENDIX C

Copied from:
Geology and Groundwater Resources of the Helena Valley, Montana
by Lorenz & Swanson
USGS Circular 83
April, 1950

EXPLANATION

Domestic and stock well

Irrigation well

Flowing well

Spring

Thermal spring

Chemical analysis made of water from well

Chemical analysis made of surface water

3660

Contours on ground-water surface in April 1948

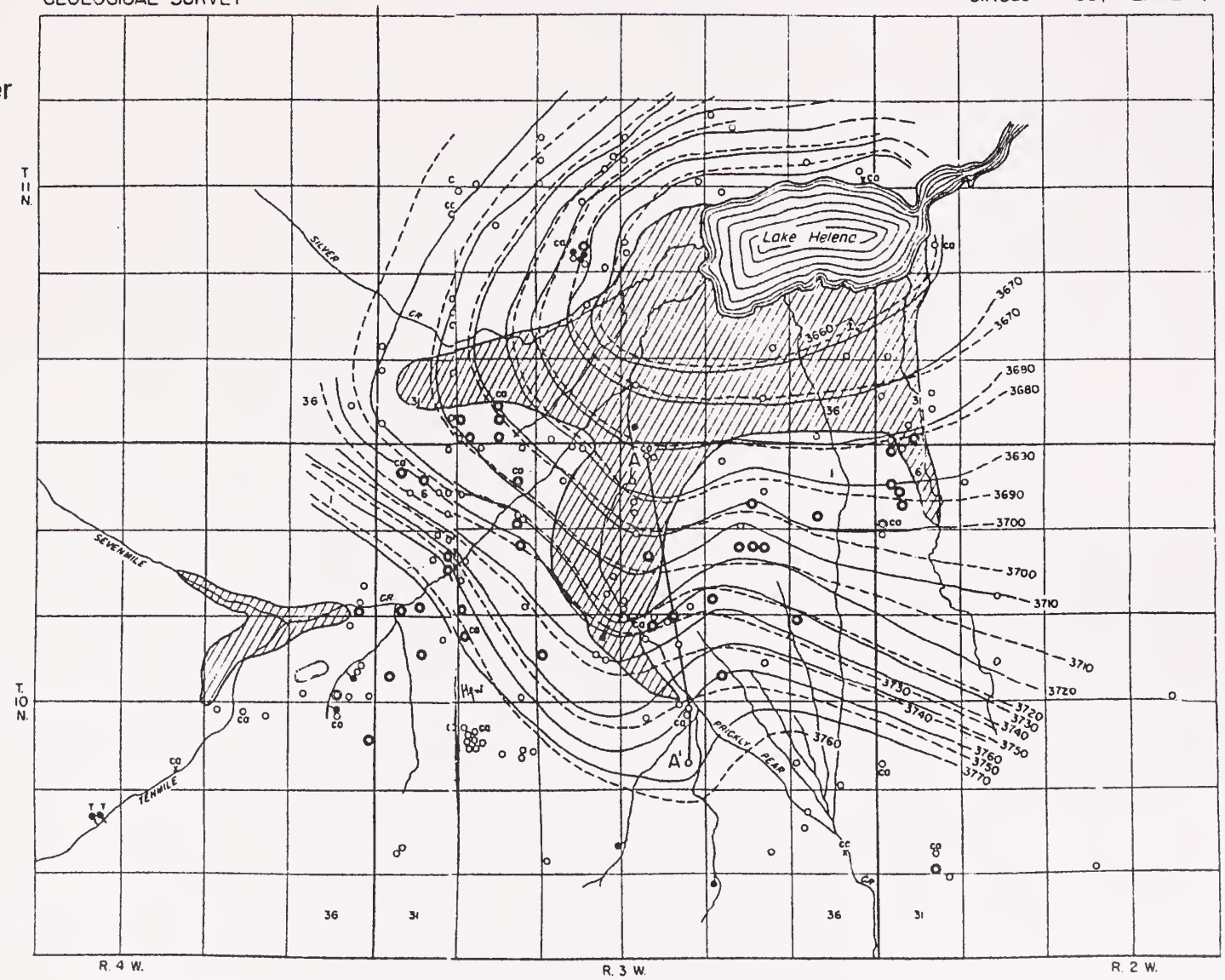
3660

Contours on ground-water surface in August 1948

A-A'

Section showing changes of water level (Plate 3)

Waterlogged area



MAP OF THE HELENA VALLEY, MONTANA

Showing location of wells, contour lines on the ground-water surface for April and August 1948, and extent of waterlogged area

1 0 1 2 3 4 5 miles

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APPENDIX 2.
HELENA WETLANDS COMMUNITY PARTNERSHIP PROJECT PARTICIPANTS

THE PARTNERS

This project is a partnership effort between the Lewis and Clark County Water Quality Protection District, Lewis and Clark County Planning Department, Montana Audubon, Montana Wetlands Trust, and Pamala R. Hackley, formerly with OEA Research, Inc, and the Last Chance Audubon Society.

The Lewis and Clark County Water Quality Protection District was formed in July, 1992, with the mission to preserve, protect and improve water quality within District boundaries. Its activities are overseen by an appointed board. An inventory and assessment of wetlands in the Helena area fits well with the WQPD mission and objectives. The WQPD has coordinated several collaborative consensus-based projects working to protect and improve local watersheds, conducted water quality studies of surface and groundwater resources, and is engaged in youth and adult education. The WQPD is the sponsor for the Wetlands Community Partnership.

The Lewis and Clark County Planning Department, which is part of the Lewis & Clark County Health Department, is the primary agency responsible for planning, zoning, and subdivision review activities. It is the lead agency in the development of special districts related to roads, fire protection, and other services and facilities. The Planning Department also provides technical support to other County agencies and the public on a wide range of subjects related to land management and service provision. The Department serves the Helena/Lewis and Clark Consolidated Planning Board, the Planning and Zoning Commission, the Helena/Lewis and Clark Historic Preservation Commission, the Lincoln Community Council, the Transportation Coordinating Committee, the County Parks Board, and the Board of County Commissioners.

Since beginning its wetlands work in 1992, **Montana Audubon**, the state office of the National Audubon Society, has prevented the loss of numerous acres of wetlands. Working with Audubon members and non-members alike, Audubon assists local citizens concerned about the protection and restoration of wetlands by providing technical information, assisting with researching and writing comments on 404 permits, and organizing citizens for public hearings and other local events. Montana Audubon won a national award for its report Protecting Montana's Wetlands: An Overview of Montana's Section 404 Program, published in October 1993.

Last Chance Audubon Society, the local Helena chapter for the National Audubon Society, was established in 1982 and has been very active in resource conservation and education activities in the area. Many Last Chance members provided invaluable assistance on several aspects of this project including historical research, GPS and wetland field data collection, and GIS support.

APPENDIX 2.
HELENA WETLANDS COMMUNITY PARTNERSHIP PROJECT PARTICIPANTS

The Montana Wetlands Trust was founded by Montanans who saw the need for a public interest organization which specializes in wetland protection. The Trust works with private, government and business interests to foster wetland conservation efforts in Montana, including protection, replacement and management, as well as regulatory and mitigation activities. The Trust has conducted symposiums and workshops on a variety of wetland subjects including on wetland banking, wetland delineation and functional assessment, and wetland education. Audiences have included Tribal staff, local governments, and professionals. Charles van Hook, the founding member and Board Chair, is a wetlands specialist and provided techincal expertise to the project.

Pamala R. Hackley is a soil scientist, based in Helena, and has provided natural resource consulting services for over 20 years. She is a certified pofessional wetlands scientist and provided techincal expertise to the project.

The Wetlands Community Partnership Members

Spencer Shropshire	Last Chance Audubon Society
Mike McHugh	Lewis & Clark County Planning Dept.
R.J. Zimmer	Lewis & Clark County Information and Technology Services
Susan Palermo	Lewis & Clark County Water Quality Protection District
Kathy Moore	Lewis & Clark County Water Quality Protection District
Janet Ellis	Montana Audubon
Susan Lenard	Montana Audubon
Charles van Hook	Montana Wetlands Trust
Pam Hackley	Soil Scientist, formerly with OEA Research, Inc.
Alan McCormick*	Lewis & Clark County Planning Dept.
Pat Hettinger*	Lewis & Clark County Water Quality Protection District
Vivian Drake*	Lewis & Clark County Water Quality Protection District

* Partners who started with the project who have moved on to other positions

Advisory Group

Lynda Saul	Wetlands Program Director, MT Dept. of Environ. Quality
Rob Hazlewood	US Fish and Wildlife Service
Carolyn Loendorf	Lewis & Clark County Commissioner
Steve Potts	U.S. Enviromental Protection Agency
Jeff Herbert*	Montana Dept. of Fish, Wildlife and Parks

Critical Support

Drew Overholser	Montana Watercourse
Amy Zarrett	Montana Audubon
Lisa Fairman	OEA Research, Inc.
Cedron Jones	Last Chance Audubon
Noami Smith	Last Chance Audubon

APPENDIX 2.
HELENA WETLANDS COMMUNITY PARTNERSHIP PROJECT PARTICIPANTS

Jean Smith	Last Chance Audubon
Martie Crone	Last Chance Audubon
Brian Shovers	Last Chance Audubon
Peggy Smith	Last Chance Audubon
Earl Smith	Last Chance Audubon
Randy Poulsen	Last Chance Audubon
Dorothy Poulsen	Last Chance Audubon
Sara Toubman	Last Chance Audubon
Sue Jackson	Last Chance Audubon
Cathy Maynard	Montana State Library, Natural Resources Information System
Steve Larsen	Lewis & Clark County Planning Dept.
Kevin Bonn	US Fish and Wildlife Service, Denver
Chuck Elliott	US Fish and Wildlife Service, Denver
Gary Ellingson	Montana Forest Stewardship Program

Folks who provided resource materials, slides, ideas, and other support

Ed Tyanich	Photographer
Tony Rolfes	Natural Resources and Conservation Service
Ed Surburgg	Tetra Tech EMI
Mary Ellen Wolfe	Montana Watercourse
John Etgen	Montana Watercourse
Shannon Heath	US Fish and Wildlife Service
Sue McNeal	US Fish and Wildlife Service
Jack Greenlee	Montana State Library, Natural Heritage Program
Lex Riggle	Natural Resources and Conservation Service
Mike Korn	Montana Dept. of Fish, Wildlife and Parks
Gayle Joslin	Montana Dept. of Fish, Wildlife and Parks
Tom Palmer	Montana Dept. of Fish, Wildlife and Parks
Amanda Abbott	Lewis & Clark Water Quality Protection District
Mike Murray	Lewis & Clark County Commissioner
Cathy Macefield	City of Helena Planning Dept.
Sharon Haugan	Lewis & Clark County Planning Dept.
Jim Foster	Helena Irrigation District
Craig Winterburn	Landowner
Ed Madej	Montana State Library, Natural Resources Information System
Dick Long	USDI Bureau of Reclamation
Stan Frasier	Montana Wildlife Federation
Roxa French	Bitter Root Water Forum
Larry Urban	Montana Dept. of Transportation

Ray Hunthausen and Members Green Meadow Golf Course
Montana Wetlands Council
Montana Aerial Photography

Dan Jenkins	Artist

Helena Area Landowners who gave us access to their properties

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HELENA COMMUNITY PARTNERSHIP WETLANDS GRANT BUDGET

Personnel	Hourly Rate	TASK A Startup	TASK B Data Comp	TASK C Training	TASK D/E Map Dev.	TASK F Classify	TASK G Ground-truthing	TASK H Analysis	TASK I Brochure	TASK J Outreach	TASK K/L Road Show	TASK M NWI/GIS	TOTAL HOURS	TOTALS	IN-KIND HOURS	TOTAL DONATED	GRANT REQUEST
WQPD																	
Drake	23.58	34	24	24	28		20	24	20	12	28	16	230	5423	82	1934	3490
Hettinger	17.94	30	24	24	24		32	32	20	12	38	18	254	4557	80	1435	3122
Palermo	18.90	10							15	24	38	12	100	1890	24	454	1436
Cty. Plan. Brd.	25.00	32		30					15		32		109	2725	109	2725	0
PLANNING																	
McCormick	20.31	12	18		18			32	16	28	28	10	162	3290	32	650	2640
WETLANDS TRUST																	
van Hook	50.00	12	8	8	64	36	50	30	12	12	30	10	272	13600	60	3000	10600
OEA RESEARCH																	
Hackley	50.00	12	8	8	64	36	50	30	12	12	30	11	273	13650	60	3000	10650
Cartographer	40.00				20								20	800			800
AUDUBON																	
Ellis	35.00	12		40	65		50	25	24	26	30		272	9520	55	1925	7595
Volunteers	8.00			40	125		420						585	4680	585	4680	0
NRIS																	
Educator	38.00			24			6					4	34	1292	10	380	912
NWI Center	50.00											80	80	4000			4000
TOTAL PERSONNEL		**154**	**82**	**198**	**408**	**72**	**628**	**173**	**134**	**126**	**254**	**161**	**2391**	**65427**	**1097**	**20182**	**45245**
																	45245
OPERATING SUPPLIES																	
MATERIALS																	
Infrared Photos (12)																	2800
B&W Air Photos (40)																	1500
USGS Topos (30)																	120
Soil Maps (copies)																	500
Historical Maps/Photos																	425
Map repro/Scanning																	456
Mylar/Color Map Printing																	150
Film Developing																	175
Office Supplies																	100
PUBLIC EDUCATION/ROAD SHOW																	
Per Diem ($75/day/3 people/12 days)																	2700
Mileage (avg. 300 mi/trip/5 trips@0.32/mi)																	480
Equip. rental (slide projector, screen, mtg. room)																	600
Digital conversion of maps/slide																	201
Poster Board/display materials																	377
MILEAGE																	
$0.32/mi																	370
Per Diem (volunteers $26/day)																	349
COPY CHARGES																	400
BROCHURES (2500)																	1625
L&C ADMINISTRATION																	1960
																	15288
														PROJECT TOTAL COSTS			**80715**
														GRANT REQUEST			**60533**
														CONTRIBUTION (25%)			**20182**

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APPENDIX 4
AERIAL PHOTO/MAP DATA SOURCES AND INFORMATION

Aerial Photgraghy
National Wetlands Inventory
Application Forms

AERIAL PHOTOGRAPHY

Werth, L.F. and E.A. Work, Jr. 1991. Inventory and Monitoring Coordination: Guideines for the use of Aerial Photography in Monitoring. USDI Bureau of Land Management. Technical Reference 1734-1. 33 p.

Pritchard, D., P. Clemmer, M. Gorges, G. Meyer, and K. Shumac. 1996. Riparian Area Management. USDI Burea of Land Management - PFC Aerial Photo Interpretation Team. Technical Reference 1737-12. 42 p.

P. Clemmer. 1994. Riparian Area Management: the Use of Aerial Photography to Manage Riparian-Wetland Areas. USDI Burea of Land Management - PFC Aerial Photo Interpretation Team. Technical Reference 1737-10. 55 p.

To Order Maps, Digital Data, and other Products:

USDA - ASCS
2222 West, 2300 South
P.O. Box 30010
Salt Lake City, UT 84130-0010
(801) 975-3503
http://www.apfo.usda.gov/

For SCS photos from 1941 and earlier contact:

National Archives and Records Service
Cartographic Division
General Services dministration
Washington, D.C. 20408
(703) 756-6700

For USGS Aerial Photos and Maps contact:

US Dept of Interior - US Geological Survey
Earth Science Information Center
http://ask.usgs.gov/

Local AP (overflying) providers may be able to share or sell flights that they have acquired for various clients; in some cases they may be able to reproduce the photograghy products to fit your specific needs.

NATIONAL WETLANDS INVENTORY

To Order Maps, Digital Data, and other Products:

Visit the WEB site -- http://wetlands.fws.gov/

Call or Write --

Have ready USGS topographic quadrangle name and state

USGS/ESIC
National Headquarters
507 National Center
Reston, Virginia 20192
(703) 648-5920
(1-888) 275-8747

South Dakota State University
Wildlife & Fisheries Dept.
Box 2140-B
Brookings, SD 57007
(605) 688-5894
http://www.wfs.state.edu/

To Get Assistance with NWI Mapping for Montana:

Chuck Elliott
USFWS- Region 6
P.O. Box 25486
DFC
Denver, CO 80225
(303) 236-7400 ext. 257 or 259

Documents:

NWI Maps Made Easy: A User's Guide to National Wetlands Inventory Maps of the Mountain-Prairie Region. February 1993. US Fish and Wildlife Service, NWI, P.O. Box 25486, DFC, Denver, CO 80225.

Cartographic Conventions for the National Wetlands Inventory, US Fish and Wildlife Service. February 1994. St. Petersburg, FL. 72 pp.

Digitizing Conventions for the National Wetlands Inventory, US Fish and Wildlife Service. November 1994. St. Petersburg, FL. 21 pp and attachments.

Photointerpretation Conventions for the National Wetlands Inventory, US Fish and Wildlife Service. January 1995. St. Petersburg, FL. 60 pp.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitat of the United States. Biological Services Program; FWS/OBS-79/31. Office of Biological Sciences, Fish and Wildlife Service, US Dept. of Interior, Washington, D.C. USGPO Stock No. GPO 024-010-00524-6.

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FARM SERVICE AGENCY

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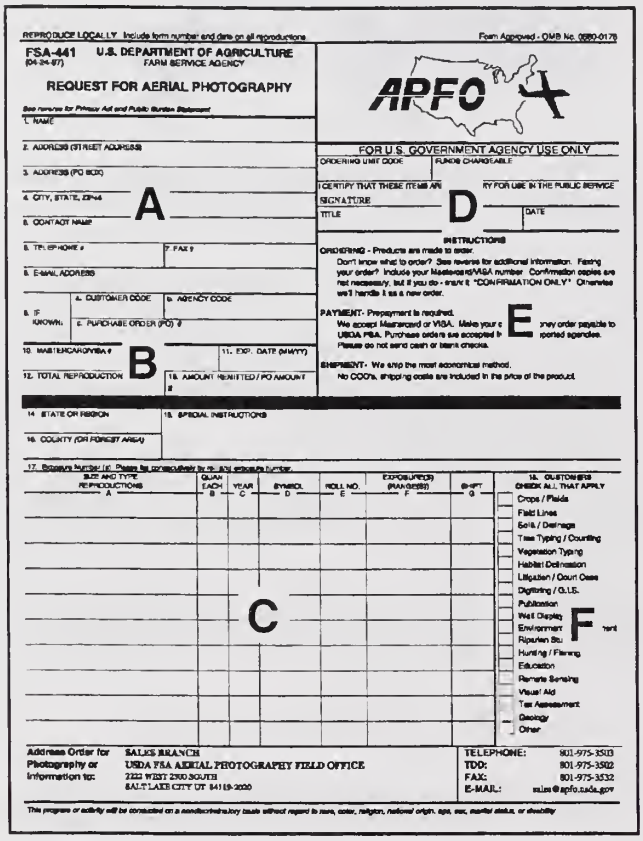
FSA-441 (Reverse) (04-24-97)



REPRODUCE LOCALLY. Include form number and date on all reproductions — Form Approved - OMB No. 0560-0176

FSA-441 (04-24-97) U.S. DEPARTMENT OF AGRICULTURE FARM SERVICE AGENCY

REQUEST FOR AERIAL PHOTOGRAPHY

See reverse for Privacy Act and Public Burden Statement

1. NAME
2. ADDRESS (STREET ADDRESS)
3. ADDRESS (PO BOX)
4. CITY, STATE, ZIP+4
5. CONTACT NAME
6. TELEPHONE #
7. FAX #
8. E-MAIL ADDRESS
9. IF KNOWN: a. CUSTOMER CODE b. AGENCY CODE c. PURCHASE ORDER (PO) #
10. MASTERCARD/VISA #
11. EXP. DATE (MMYY)
12. TOTAL REPRODUCTION
13. AMOUNT REMITTED / PO AMOUNT #
14. STATE OR REGION
15. SPECIAL INSTRUCTIONS
16. COUNTY (OR FOREST AREA)

A B C D E F

APFO

FOR U.S. GOVERNMENT AGENCY USE ONLY

ORDERING UNIT CODE | FUNDS CHARGEABLE

I CERTIFY THAT THESE ITEMS ARE ... BY FOR USE IN THE PUBLIC SERVICE

SIGNATURE

TITLE | DATE

INSTRUCTIONS

ORDERING - Products are made to order. Don't know what to order? See reverse for additional information. Feeling your order? Include your Mastercard/VISA number. Confirmation copies are not necessary, but if you do - mark it "CONFIRMATION ONLY". Otherwise we'll handle it as a new order.

PAYMENT - Prepayment is required. We accept Mastercard or VISA. Make your c... USDA FSA. Purchase orders are accepted f... Please do not send cash or blank checks. ...oney order payable to ...ported agencies.

SHIPMENT - We ship the most economical method. No COD's, shipping costs are included in the price of the product.

17. Exposure Number (s): Please list consecutively by roll, and exposure number

SIZE AND TYPE REPRODUCTIONS A	QUAN EACH B	YEAR C	SYMBOL D	ROLL NO. E	EXPOSURE(S) (RANGE(S)) F	SHIFT G

18. CUSTOMER CHECK ALL THAT APPLY
- Crops / Fields
- Field Lines
- Soils / Drainage
- Tree Typing / Counting
- Vegetation Typing
- Habitat Delineation
- Litigation / Court Cases
- Digitizing / G.I.S.
- Publication
- Well Display
- Environment
- Riparian Stu...
- Hunting / Fishing
- Education
- Remote Sensing
- Visual Aid
- Tax Assessment
- Geology
- Other

Address Order for Photography or Information to: SALES BRANCH, USDA FSA AERIAL PHOTOGRAPHY FIELD OFFICE, 2222 WEST 2300 SOUTH, SALT LAKE CITY UT 84119-2020

TELEPHONE: 801-975-3503 TDD: 801-975-3502 FAX: 801-975-3532 E-MAIL: sales@apfo.usda.gov

This program or activity will be conducted on a nondiscriminatory basis without regard to race, color, religion, national origin, age, sex, marital status, or disability

A Your customer information - please include your street address (2) and telephone number (6). If you are a tax-supported organization and want to be billed, place your purchase order number here (9c).

B Total reproductions (12) - in this area indicate the total number of reproductions by product (i.e. 1-24x24, 2-38x38).

Amount remitted/PO amount (13) - by check, money order or Mastercard/VISA (10).

C Special instructions (15) - provide any special instructions you require of us to process your order.

Size and type reproduction (17a) - refer to Prices for Aerial Photographic Reproductions (FSA-441A).

Symbol (17d) - you may know it as project code (ID), FIPS codes, etc.

Roll No. (17e) - is a unique number related to a specific project.

Exposure(s) (range(s)) (17f) - put the exposure number or range of exposures here. Refer to FSA-441A (Reverse).

D U.S. Government Agency Use Only - this may substitute for your purchase order. For FSA orders, your signature is required.

E Instructions - these are brief instructions related to your order. See "HOW TO ORDER AERIAL PHOTOGRAPHY" below. Also, see FSA-441A.

F Checking applicable boxes will assist in identifying the purpose of the order and clarify the intended use (18).

* HOW TO ORDER AERIAL PHOTOGRAPHY

To order aerial photography: Visit your State or County Farm Service Agency (FSA) office. They can assist you in selecting and ordering the photos you need. If you don't have access to an FSA office, you can send us one of the following: a legal description of the area you are interested in (township, range, and section numbers), latitude and longitude coordinates (point and radius or four corner points), topographic, county, or city map outlining your area of interest as accurately as possible. Prints are made only after an order and payment have been received. You may order over the telephone with Mastercard or Visa if you have complete aerial photo identification numbers.

* APFO PRODUCTS AND SERVICES

Depending on the original negative scale, photographs are available in selected scales ranging from 1 inch = 5,000 feet to 1 inch = 200 feet. Paper sizes: 10" x 10" contact prints, 12" x 12" to 38" x 38" enlargements. See FSA-441A (Prices for Aerial Photographic Reproductions) for specific sizes and scales available.

* OTHER PHOTOGRAPHY

Photography secured for the Forest Service (FS) and National Resource Conservation Service (NRCS) can be purchased from us by the same procedures outlined for FSA photography. The negative scales vary from 1:6,000 to 1:80,000, depending on the project area. Most FS photography has been flown in natural color, some in black and white, and color infrared. Most NRCS photography has been flown in black and white, some in natural color and color infrared.

NOTE: The following statement is made in accordance with the Privacy Act of 1974 (5 USC 552a) and the Paperwork Reduction Act as amended. The Farm Service Agency, Aerial Photography Field Office is an Agency of the Department of Agriculture and is authorized to coordinate aerial photography programs and operations under Section 387 of the Agricultural Adjustment Act Of 1938 (7 USC 1387). The requested information on this form will be used to process aerial photography orders as specified. Furnishing the requested information is strictly voluntary, however, orders may not be processed if information is incomplete. This information may be provided: 1) to the appropriate agency, whether Federal, State, local, or foreign, charged with the responsibility of investigating or prosecuting a violation of law, or of enforcing or implementing a statute, rule, regulation or order issued pursuant thereto, of any records within this system when information available indicates a violation or potential violation of law, whether civil, criminal or regulatory in nature and whether arising by general statute or particular program statute, or by rule, regulation or order issued pursuant thereto; 2) to a court, magistrate, or administrative tribunal, or to opposing counsel in a proceeding before any of the above, of any record within the system which constitutes evidence in that proceeding, or which is sought in the course of discovery to the extent that records sought are relevant to the subject of the proceeding.

Federal Agencies may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. Public reporting burden for this collection of information is estimated to average 40 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing the reviewing and collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to U.S. Department of Agriculture, Clearance Office, OIRM (OMB No. 0560-0176), Stop 7630, Washington, DC 20250-7630. RETURN THIS COMPLETED FORM TO THE USDA FSA AERIAL PHOTOGRAPHY FIELD OFFICE AT THE ADDRESS LISTED ON THE FRONT.

REPRODUCE LOCALLY. Include form number and date on all reproductions.

FSA-441A
(12-14-98)

U.S. DEPARTMENT OF AGRICULTURE
Farm Service Agency

PRICES FOR AERIAL PHOTOGRAPHIC REPRODUCTIONS

Prices Effective February 1, 1999

Prices are subject to change. Prices listed are for items most frequently requested.

IMAGE SIZE	PRODUCT MATERIAL	PRICES
BLACK & WHITE NEGATIVE PHOTOGRAPHY (B&W)		
10" x 10"	Paper Print	$5.00
10" x 10"	Film Positive*	$10.00
10" x 10"	Film Positive* AT 1/	$10.00
10" x 10"	Film Positive* Scan 2/	$15.00
10" x 10"	Film Negative	$3.00
10" x 10"	Film Internegative	$4.50
12" x 12"	Paper Print	$12.00
17" x 17"	Paper Print	$13.00
17" x 17"	Film Positive*	$25.00
24" x 24"	Paper Print	$16.00
24" x 24"	Film Positive*	$40.00
38" x 38"	Paper Print	$50.00
38" x 38"	Film Positive*	$55.00
COLOR INFRARED POSITIVE PHOTOGRAPHY (CIR)		
10" x 10"	Paper Print	$12.00
10" x 10"	Film Positive*	$15.00
10" x 10"	Film Positive* AT 1/	$15.00
10" x 10"	Film Positive* Scan 2/	$20.00
20" x 20"	Paper Print	$32.00
24" x 24"	Paper Print	$40.00
38" x 38"	Paper Print	$70.00
COLOR NEGATIVE PHOTOGRAPHY (COLOR)		
10" x 10"	Paper 1-50 Quantity	$7.00
10" x 10"	Paper 51-1000 Quantity	$5.00
10" x 10"	Paper 1001-Over Qnty.	$2.50
10" x 10"	Film Positive*	$33.00
20" x 20"	Paper Print	$40.00
24" x 24"	Paper Print	$55.00
38" x 38"	Paper Print	$70.00

INDEX PRICES

LINE INDEX	$15.00	Line indexes are available for NAPP or NHAP, FSA rectified projects and the majority of FS photography.
PHOTO INDEX	$20.00	Photo indexes are available for FSA, NRCS, and some FS photography.

GENERAL AVAILABILITY

PROGRAMS	SCALE OF PHOTOGRAPHY	DATE RANGE	TYPE OF PHOTOGRAPHY
NAPP	1:40,000	1987-Present	B&W Negative/ **Color IR Pos.
NHAP	1:60,000	1980-1987	**Color IR Pos.
FSA & NRCS	1:40,000	1970-Present	B&W Negative
FSA & NRCS	1:20,000	1955-1970	B&W Negative
FS	Various	1955-Present	B&W and **Color Negative Color IR Pos., and Misc.

*** B&W products are available from Color Infrared (CIR) or Color negative photography.*

ORDERING INFORMATION

PRODUCT TYPE — Designate the type of product you are ordering. For example:
24" x 24" B&W Paper Print
10" x 10" CIR Film Positive
38" x 38" Color Paper Print

PAYMENT — Prepayment is required. We accept Mastercard or Visa. Make checks or money orders payable to: **USDA FSA**. Purchase orders are accepted from tax-supported agencies. No COD's.

SHIPMENT — We ship the most economical method. No COD's. Costs are included in the price of the product.

* *Transparencies - A clear-based film product made visible by projecting light through the product material.*
1/ Suitable for point marking and mensuration in the aerotriangulation process.
2/ Suitable for scanning for digital ortho photo production.

Address Order for Photography or Information to:

SALES BRANCH
USDA FSA AERIAL PHOTOGRAPHY FIELD OFFICE
2222 W 2300 S
SALT LAKE CITY UT 84119-2020

Telephone: 801-975-3503
TDD: 801-975-3502
FAX: 801-975-3532
E-Mail: sales@apfo.usda.gov

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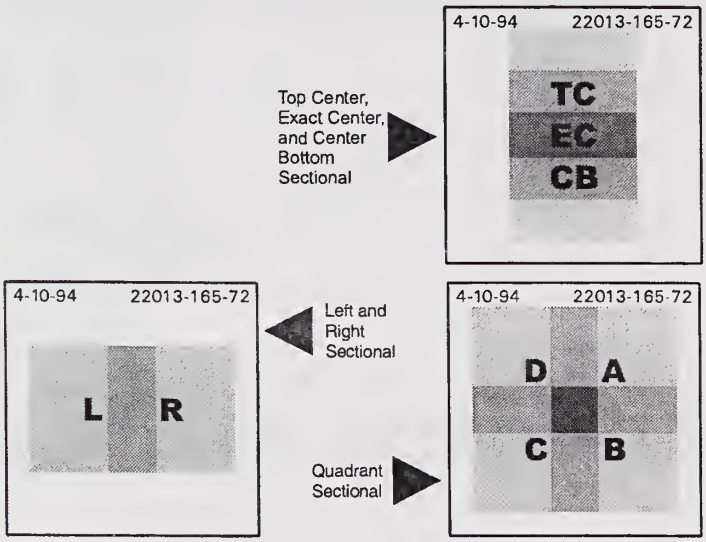
SCALES AND PRODUCT TYPES

10" x 10" CONTACT PRINTS, FILM POSITIVE TRANSPARENCIES AND FILM NEGATIVES – Direct copies from the full frame. Not available as sectionals or with scale accuracy.

APPROXIMATE SCALES OF ORIGINAL PHOTOGRAPHY		DISTANCE ALONG ONE SIDE OF PHOTO
FRACTIONAL SCALE	10" x 10" SCALES FEET/INCH	
1:20,000	1667	2.84 miles
1:40,000	3333	5.68 miles
1:60,000	5000	8.52 miles

ENLARGEMENTS

From the full frame, enlargements are available in the sizes and at the approximate scales shown in the following table. Scales requiring "sectional" enlargements are made from one-fourth (1/4) of the full frame.



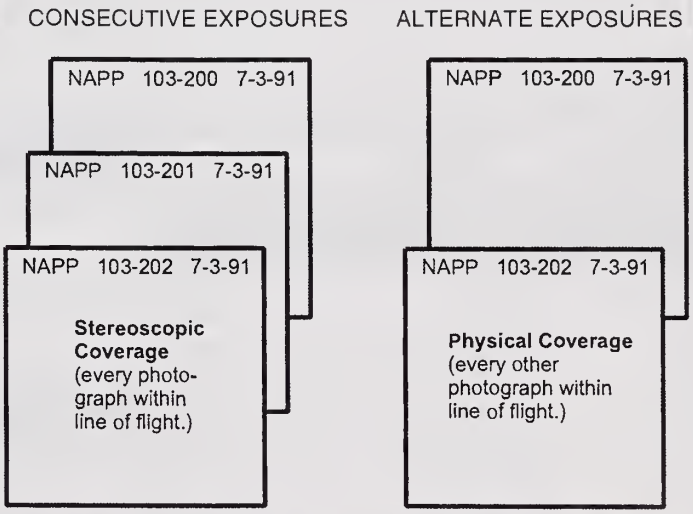
PAPER SIZE	DIAMETER OF ENLARGEMENT	APPROXIMATE FEET/INCH FROM		
		1:20,000 PHOTOGRAPHY	1:40,000 PHOTOGRAPHY	1:60,000 PHOTOGRAPHY
12" x 12"	1.26x	1"=1320'	1"=2640'	1"=4000'
12" x 12"	2.53x Sectional	1"=660'	1"=1320'	1"=2000'
17" x 17"	1.66x	1"=1000'	1"=2000'	1"=3000'
17" x 17"	3.33x Sectional	1"=500'	1"=1000'	1"=1500'
20" x 20"	2.00x	1"=834'	1"=1667'	1"=2500'
20" x 20"	4.00x Sectional	1"=417'	1"=834'	1"=1250'
24" x 24"	2.53x	1"=660'	1"=1320'	1"=2000'
24" x 24"	5.05x Sectional	1"=330'	1"=660'	1"=1000'
38" x 38"	4.15x	1"=400'	1"=800'	1"=1320'
38" x 38"	8.33x Sectional	1"=200'	1"=400'	1"=660'

INDEXES If you are selecting a large quantity of prints in the same area or have a continuing need for this type of information, you may want to purchase the indexes which cover your area of interest.

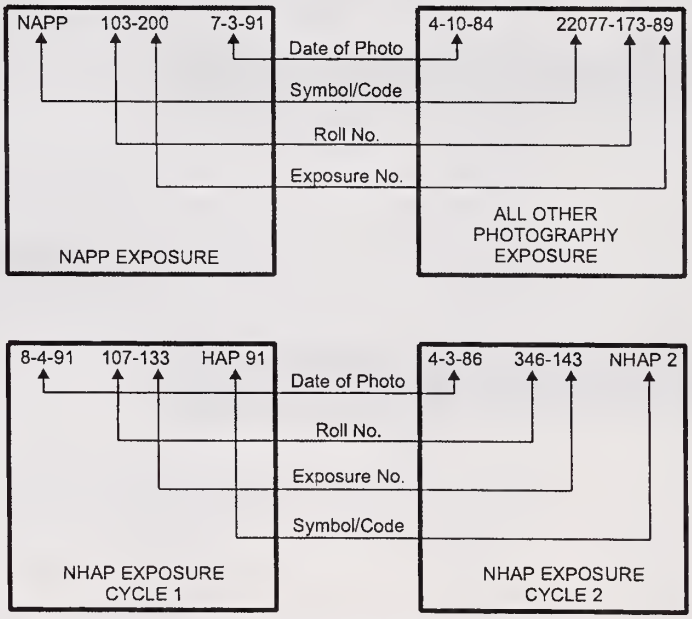
TYPES OF COVERAGE

STEREOSCOPIC COVERAGE requires consecutively numbered prints within the line of flight.

PHYSICAL COVERAGE requires every other print within the line of flight.



EXAMPLE OF FILM EDITING



METHODS FOR DETERMINING PRINT SELECTION

IF YOU DO NOT KNOW THE PHOTO EXPOSURE IDENTIFICATION:

1. Consult your local County FSA, NRCS, or Forest Service office.
2. Furnish a detailed description of your area of interest indicating latitude-longitude, township-range, etc. for our use in making a selection for you.
3. Furnish a detailed map outlining your exact area of interest for our use in making a selection for you.
4. Contact USDA FSA Aerial Photography Field Office.

U|S
G|S U.S. Geological Survey - National Mapping Information

Checklist for Aerial Photographs

1. If you know the project, roll, and frame number of the photographs you want, contact the nearest ESIC for ordering assistance.

2. If you do not know the precise aerial photograph you need, print and complete this form and return it with your **marked map** to any ESIC. A researcher will provide information about available photographs that match your requirements. Please include your daytime telephone number. If you have questions call **1-800-USA-MAPS**.

Date:

Name (first, middle initial, last):

Company or Agency:

Address:

City, State, and ZIP code:

Telphone Number (day):

FAX number:

E-mail address:

Specific area to be shown (enclose a ***detailed marked map***)

State: County: Town:

USGS quadrangle map name (if known):

Township, range, and section (if known):

Latitude and longitude (if known):

Specific feature (crossroads, neighborhood, or farm) you want to see:

Please describe your intended use (to assist the researcher):

Film Type

Most aerial photographs on record were taken with black-and-white film. Color-infrared photographs are available for the entire country. Some natural-color photographs are also available.

For detailed information about color-infrared film, refer to the publication "Understanding Color-Infrared Photographs and False Color Composites" available from any ESIC.

Black and White

Color infrared

Color (limited availability)

No preference

Date of Photograph

Most recent

Oldest

Specific year or range of years:

Season of year, if you have a preference:

Stereoscopic Coverage A three-dimensional view of the terrain can be obtained by overlapping and viewing a consecutive pair of photographs through a stereoscope.

Yes

No

Comments:

ESIC Home Page. **Mapping Information Home Page**

URL: *http://~~mapping.usgs.gov/esic/apcheck.html~~* ask.usgs.gov.
Maintainer: spshivers@usgs.gov
Last modified: 07AUG96 sps
FAX (801) 975-3740 SLC- ESIC

Also. Sioux Falls - EROS Data Center
(605) 594-6151

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APPENDIX 5
EXPLANATION OF INFRARED FILM

The following is taken in part from Kodak publication AS-69., downloaded Nov. 9,1999, Steve Mango, Product Development Manager,C&GS Aerial Imaging, E-mail: smango@kodak.com.

...the reflection from living vegetation in the infrared portion of the electromagnetic spectrum is very different from that in the visible portion. The energy of the reflection in the IR region is much higher, and consequently there are much greater differences between species in the IR region than in the visible portion, where they generally look similar. Water absorbs infrared radiation, so IR films are also used in hydrological studies and in mapping wetlands & coastal areas; water appears black in an IR image, hence the delineation between water and land is quite dramatic. To a great extent, this is true for water or moisture content of soils also.

Generally, in spring and summer, healthy deciduous trees photograph magenta or red, and healthy evergreens photograph brownish red. Dead or dying deciduous leaves or evergreen needles usually photograph anywhere from dark red to green or even yellow. The leaves of deciduous trees, which turn red or yellow in autumn, still retain some of their infrared reflectivity for a while. Consequently, red leaves may photograph yellow, and yellow leaves may photograph white. In any given vegetation, the season, the water and mineral content of the soil, and the age and health of the vegetation may cause its infrared reflectance to vary. In fact, the first sign of a distressed tree (or plant) is often a decrease in infrared reflectance, which frequently first becomes apparent in color infrared photography.

CIR photograghy is well suited to study wetlands, especially if the photography is taken at the end of the growing season of the surrounding uplands. Wetlands typically have longer growing seasons that native uplands so that the actively photosynthiesizing wetland vegetation still gives a high reflectance. Thus wetlands and uplands can be easily distinguished. One also has to be able to distinguish areas of irrigation - farms lands, lawns, golf courses, etc. that will also have high reflectance signature. Usually the regular shape and very distinct boundaries are good clues that an area is irrigated. If the timing is optimal, the maximum extent of wetlands in a given year can then be determined. Provided that the ground is snow free, photography can be flown early in the year when wetland plants are active but upland areas are still dormant.

Color Infrared-Sensitive Films

Any portion of the spectrum to which photographic materials are sensitive can be recorded in a color film if the individual emulsion layer is correspondingly sensitized. Furthermore, the color of the dye formed in a particular layer need bear no relationship to the color of light to which the layer is sensitive. If the relationship is not complementary, the resulting colors are false. False-color films can be used to emphasize differences between objects that are visually quite similar.

APPENDIX 5
EXPLANATION OF INFRARED FILM

Color infrared-sensitized films emphasize differences in infrared reflectance. Figure 1 is a simplified diagram that demonstrates graphically how the colors of the terrain are reproduced falsely on color infrared-sensitive films such as KODAK AEROCHROME Infrared Films.

As indicated in Figure 1, all three layers are inherently sensitive to blue radiation. Therefore, to limit the exposure of each layer of color infrared film to only its intended spectral region, a yellow filter (minus blue) such as a KODAK Filter No. 12 (or equivalent) is always used over the camera lens. It can be seen that with the yellow filter in place, the layers act as though they were sensitive only to infrared, green, and red (as all blue radiation is absorbed by the filter). The gray-screened areas in the top portion of the diagram illustrate exposed areas of silver halide in the various layers from each of the spectral bands reflected from the original scene. Thus, three separate negative silver records are formed.

Where there is no exposure, the recommended reversal processing will yield cyan dye in the infrared-sensitive layer, yellow dye in the green-sensitive layer, and magenta dye in the red-sensitive layer. When an image is exposed, the amount of dye formed is inversely proportional to the exposure. The bottom portion of Figure 1 illustrates the dye formation and resulting colors after exposure and processing. Infrared radiation appears as red which is the result of yellow dye formation in one layer and magenta dye formation in a second layer and the absence of cyan dye. Green reproduces as blue—the result of cyan dye formation in one layer and magenta dye formation in a second layer and the absence of yellow dye. Red reproduces as green—the result of cyan dye formation in one layer and yellow dye formation in a second layer and the absence of magenta dye.

Blue in the original subject has not been recorded because of the filter and, therefore, is rendered as black. Numerous other colors will be formed, depending on the proportions of green, red, and infrared reflected or transmitted by the original subject.

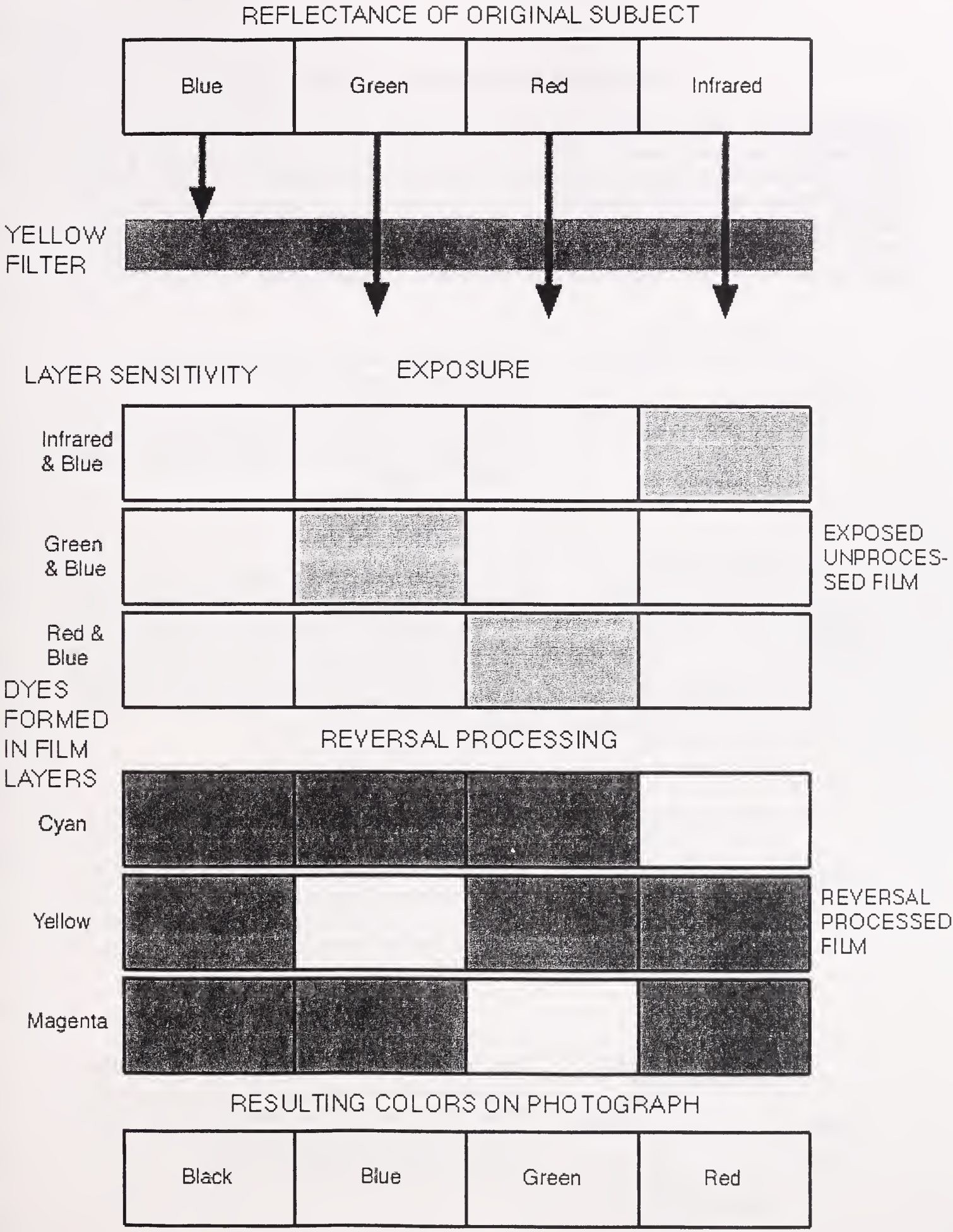


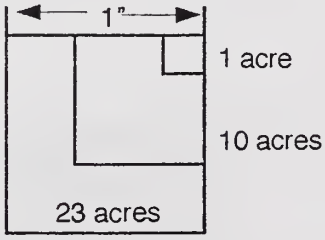
Figure 1. Color Reproduction with Kodak Aerochrome Infrared Films.
Adapted from Kodak Publication AS-69

APPENDIX B: MAP AND AERIAL PHOTO SCALES

The scales shown here are commonly found as a format for maps and aerial photos. For each example we have drawn a square inch (1") into which we have inserted a small square which shows the size of one acre of land as it would appear on a map or photo. The next largest square shows the size of a 10 acre area, (note that the 10 acre area is actually larger than our one inch template at the scale of 1:6,000). We have also included a number in the bottom of the one inch template which represents the number of acres of surface which would be included in a one inch square if it were drawn on a map or photo.

1:12,000

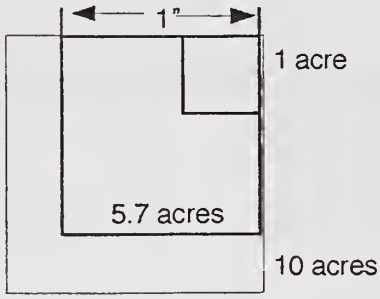
1"=1,000'



The 1:12,000 scale is what we chose for our aerial photography. We took 79 photos at an elevation of 6,000 feet above ground surface to cover our study area. These images can easily be reduced by 50% to fit the county GIS format which is 1:24,000.

1:6,000

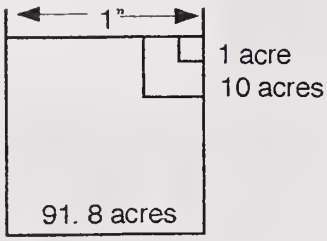
1"=500'



The 1:6,000 scale is achieved by doubling the size of our 1:12,000 photos. This image is good for work sheets, ie. drawing the edges of wetlands and finding exact survey points used in our GPS work. The wetland vegetation appears as though you were suspended 3,000 feet overhead.

1:24,000

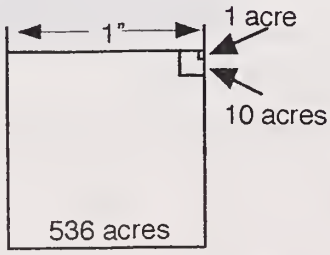
1"=2,000'



The 1:24,000 scale is used by the USGS for our local topographic maps. These base maps are also used by the USF&WS for the National Wetlands Inventory (see blue polygons). This scale is used by most GPS systems, it is not easy to record a wetland less than 5 acres in size on a map at this scale.

1:58,000

1"=4,833'



The 1:58,000 scale was used by the USF&WS for their wetlands imaging in the Helena Valley. While this scale requires fewer photographs, it is more difficult to accurately locate boundaries or smaller wetlands on these images.

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APPENDIX 6
HELENA MONTANA AREA - HISTORICAL SOURCES RESEARCH - EARLY SETTLEMENT REFERENCES

Prepared by Spencer Shropshire, Last Chance Audubon Society

July, 19, 1805: Captain Clark notes "my feet verry much brused & cut walking over the flint, & constantly stuck full of Prickly pear thorns, I puled out 17 by the light of the fire to night..." He had traversed Ordway's Creek, now the Little Prickly Pear, and then through the Valley, so named because of the seventeen thorns.

1845: French fur trappers settled briefly in the Valley at unknown site.

1853: Stevens Expedition formed. Isaac Stevens was a 35-year old Army engineer, and had been made territorial Governor of Washington. They were to find four possible railroad routes, organized under Jefferson Davis, the Secretary of War. The group included Lt. John Mullan, then 23.

1858: Mullan's Road completed into the Valley, passing a settlement at Silver City. It is likely that Sevenmile and Tenmile creeks are named for distances along the road enroute to Helena. The road paralleled the Little Prickly Pear, where the Chevallier ranch is, then followed Birdseye Road and Country Club Avenue.

1862: Fisk expedition leaves Fargo for the coast, but several wagons leave train for Prickly Pear Valley after rumors of gold. Its members include the three Fisk brothers, who founded the Helena Herald, James Fergus, and N. P. Langford, who became first Superintendent of Yellowstone Park. Homestead Act is passed, with what will ultimately be demonstrated as 66% failure rate.

July 14, 1864: Gold discovery, Last Chance Gulch. John Sommerville proposes the camp be called St. Helena, to honor Napoleon. Others agree, if he'll allow dropping the Saint part.

December, 21, 1864: Prickly Pear Valley Club formed "for the protection of claims or ranches". Most claims are for "farming, rancheing, or haying", and must have a house built by the first day of May, 1865, "Suitable to Live in, and further the House shall have a Roof and a Door".

April 18, 1865: Cornelius Hedges, graduate of Yale and Harvard law School, writes home from "Helen City", having come from above Virginia City.

Dear Parents,
Came into this part of the country in Jan last. Had as money not even a dollar - made a living and a thousand dollars besides. This city has grown up like Jonah's gourd in a night almost. 20 houses when I came, and now

500. There is not much water in this camp, but water ditches are bringing it in...in this country there is plenty of wood, but it is all pine - a few willows and cottonwood grow along the creek. As to birds, we have plenty of them, robins, crows, prairie chickens, magpies, grouse, ducks & geese, and many other small kinds of birds.

August 23, 1865: Henry Harmon Clark writes to his brother Sanford in Iowa:

There is a nice valley between this place and the river and the best of it is taken up for farms, the land haves to be irrigated for crops I believe it is a good wheat country and first rate for stock but I can see no inducement for immigration.

May 1867: Tenmile Ditch and 75 foot high flume across Grizzly Gulch completed.

1868: Forts along the Bozeman Trail are abandoned after inability to withstand Red Cloud and his Sioux; road remains virtually closed until completion of Sioux Wars of 1876, 1877.

May 1869: Transcontinental completion of Union Pacific at Ogden, Utah; traffic increases on Corinne-Virginia City-Helena Road, which takes 4 1/2 to 6 days and nights (they traveled at night as well).

1873: Financial panic collapse of Cooke Bank. He had been unable to sell bonds for railroad expansion to Europeans because of Franco-Prussian War.

June 1883: Construction crews of Northern Pacific RR reach Helena; transcontinental connection completed in September with gold spike being driven on Gold Creek near Garrison.

1887: James J. Hill provides C. A. Broadwater funds to build Montana Central Railroad between Great Falls and Helena to compete with NPRR; Hill's Great Northern completes connection to the east after connecting Minot to Great Falls in six months, laying 3 1/2 miles of track every day.

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APPENDIX 7 NWI MAPS MADE EASY

INTRODUCTION

This guide explains how to read and interpret National Wetlands Inventory (NWI) maps. It is adapted for the Helena Community Partnership Project from the Mountain-Prairie Region guide issued 1983 by U.S. Fish and Wildlife Service, NWI, P.O. Box 25486 DFC Denver, Colorado.

Wetlands on NWI maps are classified by a series of letters and numbers which define the physical characteristics of each wetland. This guide provides definitions of specific terms and examples of wetland types which allows a quick understanding of the wetland terminology and provides a quick reference table to general wetland types. This guide also describes briefly the National Wetlands Inventory, mapping conventions, map production process, map uses, map limitations, and map legend.

NATIONAL WETLANDS INVENTORY

The need to provide a comprehensive inventory of the Nation's wetlands came from a growing awareness that wetlands provide many ecological and social values. In addition, what wetland status and trends information that does exist indicated significant losses in wetland habitat throughout the United States. Previous wetland inventories were limited in scope and complexity. Few map products were available, acreage statistics were limited, and no digital data existed.

In 1974, the U.S. Fish and Wildlife Service (FWS) recognized the shortcomings of past inventories and was given a Congressional mandate to design and conduct an updated inventory of the Nation's wetlands. The resulting project was the National Wetlands Inventory. The inventory's purpose is to foster wise use of the nation's wetlands and to expedite decisions that positively affect aquatic resources. The NWI generates and disseminates scientific information on the characteristics and extent of the Nation's wetlands.

During initial phases of the inventory, two essential project objectives were determined:

(1) development of a state-of-the-art classification scheme to categorize wetlands, and
(2) the decision to use high altitude aerial photography as the remote sensing technology to identify wetlands.

Objective number one resulted in a multiagency effort that produced the document "Classification of Wetlands and Deepwater habitat of the Unites States" (Cowardin et al. 1979). The Cowardin System defines a wetlands:

> Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow

water. For purposes of this classification wetlands must have one or more of the following three attributes:

- at least periodically, the land supports predominantly water-loving plants;
- the land is predominantly undrained hydric (wetness indicators) soil; and
- the substrate is non soil and is saturated with water or covered by shallow water at some time during the growing season of each year.

Objective number two was achieved after an extensive evaluation of all remote sensing technologies. The result was the selection of 1:58,000 high altitude color infrared imagery as the photography of choice.

NWI Map Production Process

The wetland mapping process is a many faceted activity that is production oriented. The time span between initial field work and final map production may be two years. Priority areas to be mapped are identified, aerial photography and base maps are acquired, field work is completed and photo interpretation initiated.

Wetlands are identified on overlays that are registered to aerial photographs. All wetland delineation and classification undergo many FWS and private contractor quality control reviews. Wetland identification and classification information is transferred to a 1:24,000 scale base map. Draft maps are reviewed in the field in cooperation with participating agencies. Draft map review comments are consolidated and corrections made before final maps are produced and distributed.

Final maps are often digitized so that computerized map data can be used in geographic information systems (GIS).

The NWI Map

The primary products of the NWI are large scale maps. These maps show boundaries and wetland classifications on a 1:24,000 scale USGS topographic base map. Actual wetland classifications are abbreviated on the map as codes. These map codes should be translated using the map legend located in this guide or at the bottom of each NWI map.

NWI Map Uses and Limitations

The following statement is found on all NWI draft and final maps.

> Special Note: The National Wetlands Inventory mapping shown on this document was prepared primarily by stereoscopic analysis of high altitude aerial photographs. Wetlands were identified on the photographs based on vegetation, visible hydrology, and geography in accordance with **Classification of Wetlands and Deepwater Habitats of the United States** (FWS/OBS - 79/31 Dec. 1979). The aerial photographs typically reflect conditions during the specific year and season when they were taken (7/84

and 9/87). In addition, there is a margin of error inherent in the use of the aerial photographs. Thus, a detailed on the ground and historical analysis of a single site may result in a revision of the wetland boundaries established through photographic interpretation. In addition, some small wetlands and those obscured by dense forest cover may not be included on this document.

Federal, State, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, State or local government or to establish the geographical scope of the regulatory programs of government agencies. **Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, State or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.**

NWI maps provide an excellent source of general wetland locations, boundaries and characteristics. However, as stated in the SPECIAL NOTE, they are not a substitute for on site specific investigation when detailed information is required. Certain wetlands such as those found under forest canopy can be difficult to identify on aerial photographs. Changing water practices in irrigated hay fields alter plant communities affecting photographic signatures and ultimately wetland determinations. Often times land use changes, drainage, restoration, development or other modifications occur from the time the photograph was taken to the time the map maybe actually used by another agency. Aquatic bed wetlands are often difficult to classify without the use of collateral information. Also, shallow or temporarily flooded wetlands in cropland maybe difficult to identify if the photography is acquired during a dry season. NWI maps are utilized by a wide variety of users including local, county, state, and federal conservation and regulatory agencies as well as environmental consultants, conservation groups and planning commissions. Common uses of the maps include project review, comprehensive management plans, land acquisition, habitat management, environmental impact assessment, research, education, permit review, wetland evaluation, mitigation, utility corridor and facility siting.

National Wetlands Inventory Classification System and Mapping Conventions
The Cowardin et al. (1979) wetland classification system provides National consistency of wetland concepts, terminology and classification for the NWI Project. The classification system takes a hierarchical approach to classifying different wetland types. This system of hierarchy (Figure 1) proceeds from general definitions to specific terminologies. The level of detail or degree of information increases for each wetland as one proceeds down the classification system. Specific mapping

conventions were developed to facilitate photointerpretation criteria and cartographic procedures during the map production process.

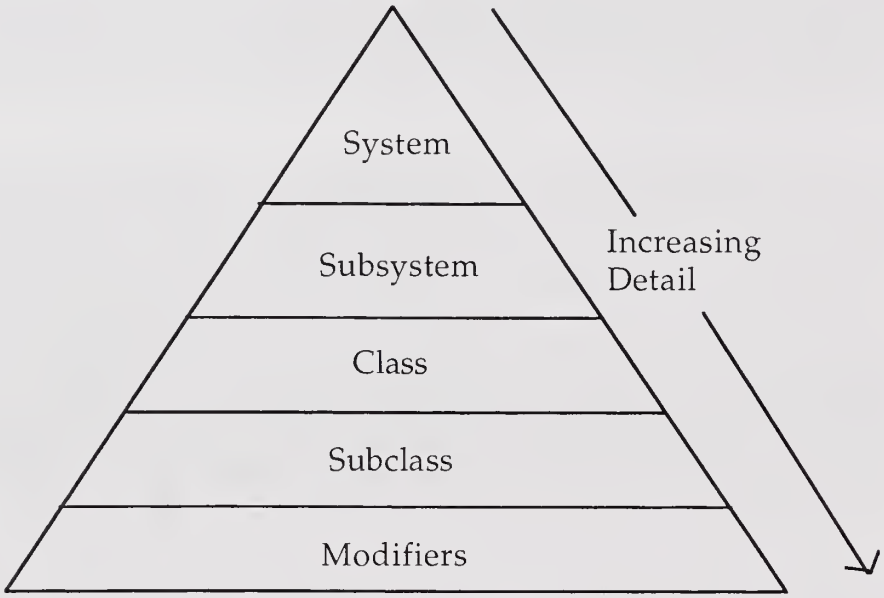


Figure 1. The hierarchical arrangement of the Cowardin et al. (1979) Wetland Classification System

The interior of the United States (Northern Rocky Mountain and Northern Great Plains) does not have several major wetland and deepwater habitats that are described in the Cowardin system, namely the Marine and Estuarine systems. Within the Marine and Estuarine systems there are associated subsystems (intertidal), classes (reef), subclasses (coral) and modifiers (tidal water regimes), that are not found in the interior United States. These parts of the Cowardin system are not described in this guide. This guide is applicable to NWI maps for North and South Dakota, Nebraska, Wyoming, Montana, Kansas, Utah, and Colorado.

THE COWARDIN WETLAND CLASSIFICATION SYSTEM

The system is briefly described. Tables 1-6 provide more detail at a glance.

Systems

"Systems" describe wetlands broadly through use of the terms Riverine (R), Lacustrine (L), and Palustrine (P). Systems are defined as wetlands that share the influence of similar hydrologic, geomorphologic, chemical, or biological factors. Systems group major categories that have recognizable and commonly accepted terms such as lakes, rivers, and marshes.

Subsystems
Systems are further divided into "subsystems" which describe major hydrologic characteristics. The riverine subsystems are intermittent, lower perennial, and upper perennial. Lacustrine subsystems are limnetic (deepwater) and littoral (shallow water). Palustrine systems do not have subsystems.

Classes
Subsystems are divided into "classes" which describe either vegetation or the substrate. If the wetland is greater than 30% in plant growth (e.g. cattail or willow), then a vegetated class is used (e.g. emergent or scrub-shrub, respectively). If the wetland is less than 30% vegetated (e.g. mud, sand, gravel) then the substrate determines the class (e.g. unconsolidated shore or unconsolidated bottom).

Subclasses
Classes are divided into "subclasses" which provides greater detail for the class. For example, in the class, emergent, there are two subclasses: persistent (plants which stand until the next growing season), and nonpersistent (plants which fall to the substrate at the end of the growing season). Subclasses are rarely used on NWI maps in the northern Rocky Mountains and Great Plains because of the difficulty in consistently identifying subclasses based on remote sensing technologies. However, on site inspections may add important information about a wetland's characteristics and the use of subclasses may be desirable. Subclasses were not identified on the NWI maps for the Helena study area.

Modifiers
Cowardin et al. provides many modifiers to further describe wetland features. Perhaps most important of these modifiers are the "water regime modifiers." Water regime modifiers are defined in terms of the growing season and qualitatively describe the general length of time water may be expected to exist in a wetland. Other modifiers include water chemistry (salinity and pH), soil (organic vs mineral), natural or man-made modifications (excavated, impounded, diked, partly drained, farmed, and artificial).

Table 1. General Characteristics of Systems

System (Map Code)	Description
Riverine (R)	Water within a channel flowing either perennially or intermittently (rivers, streams)
Lacustrine (L)	Water in a depression, generally >20 acres (lakes)
Palustrine (P)	Water in a depression, generally <20 acres and less than 2 meters (6 feet) deep (small lakes, ponds, marshes)

Table 2. General Characteristics of Subsystems*

System	Subsystem (Map Code)	Description
R	Lower Perennial (2)	Low gradient, slow velocity, well developed floodplain, sand and mud substrate, oxygen deficits at times
R	Upper Perennial (3)	High gradient, fast velocity, poorly developed floodplain, stone and rock substrate, high oxygen levels
R	Intermittent (4)	Periodic flows, isolated pools possible
L	Limnetic (1)	Deep lake; water deeper than 2 meters (6 feet) at low water
L	Littoral (2)	Shallow lakes and shorelines of deeper lakes, water depth < 2m

* There are **no** subsystems in the Palustrine system

Table 3. General Characteristics of Classes

Class (Map Code)	Description (Subclasses)
Rock Bottom (RB)	Stones, boulders, bedrock; at least semi-permanently flooded; <30% vegetated (bedrock, rubble)
Unconsolidated bottom (UB)	Cobble, sand, gravel, mud; at least at least semi-permanently flooded; <30% vegetated (cobble-gravel,sand, mud, organic)
Aquatic Bed (AB)	Plants growing on or below the water surface; at least seasonally flooded (algal, aquatic moss, rooted vascular, floating vascular)
Streambed (SB)	All wetlands in the intermittent subsystem of riverine system; seasonally flooded or less (bedrock, rubble, cobble-gravel,sand, mud, organic, vegetated streambed)
Rocky Shore (RS)	Stones, boulders, bedrock; seasonally flooded or less, <30% vegetated (bedrock , rubble)
Unconsolidated Shore (US)	Cobble, sand, gravel, mud; at least seasonally flooded or less, <30% vegetated (cobble-gravel,sand, mud, organic, vegetated)
Moss-Lichen (ML)	Mosses or lichens, only the saturated water regime (moss, lichen)
Emergent (EM)	Erect, rooted, herbaceous hydrophytes; all water regimes (persistent, nonpersistent)
Scrub-Shrub (SS)	Woody vegetation <20 feet tall; all water regimes (broad-leaved deciduous, needle-leaved deciduous, broad-leaved evergreen, needle-leaved evergreen, dead)
Forested (FO)	Woody vegetation >20 feet tall; all water regimes (broad-leaved deciduous, needle-leaved deciduous, broad-leaved evergreen, needle-leaved evergreen, dead)

Table 4. General Characteristics of Classes Water Regime Modifiers

Water Regime (Map Code)	Description
Permanently Flooded (H)	Surface water is present throughout the year in all years
Intermittently Exposed (G)	Surface water persists in most years except during extreme drought
Semipermanently Flooded (F)	Surface water is present throughout the growing season in most years
Seasonally Flooded (C)	Surface water is present for extended periods in the growing season, but is absent by the end of the season in most years
Saturated (B)	Saturated substrate to the surface for extended periods, but surface water is seldom present
Temporarily Flooded (A)	Surface water present for brief periods during the growing season
Intermittently Flooded (J)	Substrate usually exposed, but surface water is present for variable periods without seasonal periodicity
Artificially Flooded (K)	Amount and duration of flooding is controlled by pumps in combination with dams

Table 5. Commonly Used Modifiers

Modifier (Map Code)	Description
Excavated (x)	Lies within a basin or channel excavated by man
Impounded/diked (h)	Created by a barrier obstructing the outflow or inflow of water
Partly drained (d)	Water level is artificially lowered but soil moisture is sufficient to support hydrophytes
Beaver (b)	Created by or hydrologically affected by beaver activity

Table 6. Quick Cross reference of Map Codes to Common Wetland Types in the Helena Valley (using System, Subsystem, and Class)

Map Code	Common Name or Wetland Type
	Palustrine
PEM	Emergent marsh, wet meadow, slough
PAB	Pond with floating or submerged aquatic vegetation
PUS	Wetlands with exposed substrate
PUB	Pond with open water
PSS	Shrub wetland, short, woody vegetation adjacent to streams
PFO	Forest wetlands, tall woody vegetation adjacent to rivers
	Riverine
R4SB	Intermittently flowing water in a stream channel
R2UB	Slow moving perennial river with a floodplain (e.g. Tenmile Creek)
R3UB	Fast moving perennial river with no floodplain
R2US	Bank or sandbar of slow moving river
R3US	Bank, cobble/gravel bars, point bars of fast moving streams
	Lacustrine
L1UB	Deepwater zone of lake (e.g. middle of Lake Helena)
L2US	Lake shoreline or shallow water zone of lake
L2AB	Shallow lake with submerged or floating plants

How to Interpret the NWI Map Codes

The Cowardin system's terminology and map codes may seem overwhelming at first, but the user needs only a basic understanding to use the maps. This section shows how quick and easy it is to translate any map code into a meaningful description of a particular wetland type. Figure 2 is an excerpt from the Helena NWI map showing the west end of Helena including Spring Meadow Lake State Park, Lewis & Clark County Fairgrounds and Tenmile Creek. Each map code consists of an ordered series of letters and numbers that reflect certain characteristics of wetlands and deepwater habitats. The number of characters in each map code varies depending upon the wetland type. Use the figure on page 10 and the tables to work through the example shown on the map at ①.

Example 1: PUBFx, PEMCx, U (Duck Pond at the Fairgrounds)

Step 1. The first character is <u>one upper case letter</u> representing the SYSTEM.

P = Palustrine (freshwater wetland)

Remember there are **no** SUBSYSTEMS in the Palustrine system.

Step 2. The second letter in a Palustrine wetland, is a set of <u>two upper case letters</u> representing the CLASS.

UB = UNCONSOLIDATED BOTTOM (substrate composed of particles smaller than stones, and vegetation less than 30% - see table 3)

EM = EMERGENT (dominated by herbaceous emergent vegetation, cattails in this case)

Step 3. The next character is <u>one upper case letter</u> representing the WATER REGIME MODIFIER.

F = SEMIPERMANENTLY FLOODED (surface water is present throughout the growing season in most years)

C = SEASONALLY FLOODED (surface water present for extended periods during the early part of the growing season

Step 4. The last character is <u>one lower case</u> letter representing a SPECIAL MODIFIER.

x = EXCAVATED (Lies within a basin or channel excavated by man, in this case excavated (old) gravel pit (PUBFx) and ditched outlet (PEMCx).

U = UPLAND stands for non-wetland or upland that is enclosed by linears

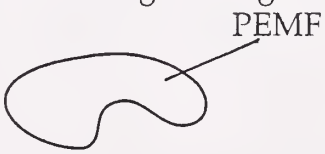
ADDITIONAL TIPS FOR INTERPRETING NWI MAPS

The inverted omega symbol ℧ represents upland.

All wetlands are delineated by either a polygon ; a linear ; or a single point • .

Wetlands are labeled with a leader line running from the wetland to the map code.

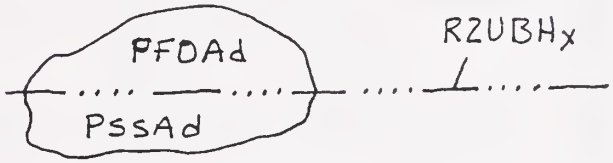
Polygons identify wetlands large enough for the photo interpreter to delineate an actual boundary.



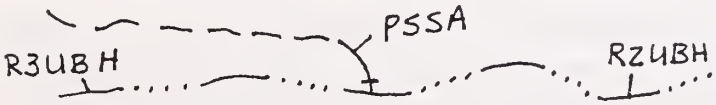
Linears identify wetlands that are too narrow to be delineated with polygons. Each linear wetland consists of either a dashed line (Palustrine linear) or a series of dots and dashes (Riverine linear) and is labeled with a leader line running from the map code. Linears are approximately 10 feet wide.

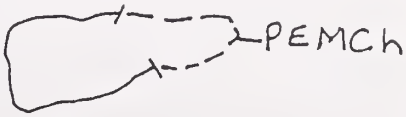
Points identify wetlands that are too small to be delineated with polygons. A point is approximately 0.1 of an acre.

A linear wetland may form the boundary of wetland polygon, or run through a wetland polygon.



The ends of a linear segment which form the boundary of a wetland polygon, or a classification change along a linear segment, are shown by a short dash which is perpendicular to the linear feature. this "short dash" is the break point (or change) in the classification.





Some map codes indicate a mixture of "classes" within a single polygon. mixed "classes" indicate that each class occupies at least 30% of the delineation.

PEM/ABF

NWI DRAFT MAP

This is a portion of a National Wetlands Inventory Map created by the U.S. Fish & Wildlife Service. A portion of the city of Helena is seen in the lower right and the Fairgrounds race track is seen in the top - center. This is a draft map at a scale of 1:24,000 made in 1998 based upon an aerial photo taken in 1987. The wetlands have been drawn over the U.S.G.S. HELENA, MONTANA topo map.

Each wetland is labeled by initials. For example, PSSA represents Palustrine, Scrub-Shrub, Temporarily Flooded.

APPENDIX 7

NATIONAL WETLAND INVENTORY WETLAND TYPES, HELENA VALLEY*, MONTANA

MAP LABEL	SYSTEM	SUBSYSTEM	CLASS**	MODIFIERS
L2ABFh	Lacustrine	Littoral	Aquatic Bed	Semipermanently Flooded
L2USCh	Lacustrine	Littoral	Unconsolidated Shore	Seasonally Flooded, Diked/Impounded
L2USAh	Lacustrine	Littoral	Unconsolidated Shore	Temporarily Flooded, Diked/Impounded
L1UBAh	Lacustrine	Limnetic	Unconsolidated Bottom	Temporarily Flooded, Diked/Impounded
PABF	Palustrine	- -	Aquatic Bed	Semipermanently Flooded
PABFh	Palustrine	- -	Aquatic Bed	Semipermanently Flooded, Diked/Impounded
PABGb	Palustrine	- -	Aquatic Bed	Intermittently Exposed, Beaver
PABKx	Palustrine	- -	Aquatic Bed	Artificially Flooded, Excavated
PEMC	Palustrine	- -	Emergent	Seasonally Flooded
PEMA	Palustrine	- -	Emergent	Temporarily Flooded
PEMB	Palustrine	- -	Emergent	Saturated
PEMCh	Palustrine	- -	Emergent	Seasonally Flooded, Diked/Impounded
PEMCx	Palustrine	- -	Emergent	Seasonally Flooded, Excavated
PEMAh	Palustrine	- -	Emergent	Temporarily Flooded, Diked/Impounded
PEMAx	Palustrine	- -	Emergent	Temporarily Flooded, Excavated
PEMAd	Palustrine	- -	Emergent	Temporarily Flooded, Partially Drained/Ditched
PEMF	Palustrine	- -	Emergent	Semipermanently Flooded
PEMCb	Palustrine	- -	Emergent	Seasonally Flooded, Beaver
PEMKx	Palustrine	- -	Emergent	Artificially Flooded, Excavated
PEMFh	Palustrine	- -	Emergent	Semipermanently Flooded, Diked/Impounded
PFOA	Palustrine	- -	Forested	Temporarily Flooded
PSSB	Palustrine	- -	Scrub-Shrub	Saturated
PSSA	Palustrine	- -	Scrub-Shrub	Temporarily Flooded
PSSAh	Palustrine	- -	Scrub-Shrub	Temporarily Flooded, Diked/Impounded
PSSC	Palustrine	- -	Scrub-Shrub	Seasonally Flooded
PSSCb	Palustrine	- -	Scrub-Shrub	Seasonally Flooded, Beaver
PUBFx	Palustrine	- -	Unconsolidated Bottom	Semipermanently Flooded, Excavated
PUBGx	Palustrine	- -	Unconsolidated Bottom	Intermittently Exposed, Excavated
PUSCx	Palustrine	- -	Unconsolidated Shore	Seasonally Flooded, Excavated
R2UBFx	Riverine	Lower Perennial	Unconsolidated Bottom	Semipermanently flooded, Excavated
R2UBG	Riverine	Lower Perennial	Unconsolidated Bottom	Intermittently Exposed
R2UBGx	Riverine	Lower Perennial	Unconsolidated Bottom	Intermittently Exposed, Excavated
R2USA	Riverine	Lower Perennial	Unconsolidated Shore	Temporarily Flooded
R3UBF	Riverine	Upper Perennial	Unconsolidated Bottom	SemipermanentlyFlooded
R3UBG	Riverine	Upper Perennial	Unconsolidated Bottom	Intermittently Exposed
R3USA	Riverine	Upper Perennial	Unconsolidated Shore	Temporarily Flooded
R4SBC	Riverine	Intermittent	Streambed	Seasonally Flooded
R4SBCx	Riverine	Intermittent	Streambed	Seasonally Flooded, Excavated

* USGS 7.5 Minute Quadrangles: Helena, Scratchgravel Hills, East Helena, Lake Helena; see acompanying descriptions.

** SUBCLASS was not identified for the study area.

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APPENDIX 8
Rationale and Guidelines for Field Data Collection and Forms

Charles and Pam will select focus areas for study and groundtruthing. Although our grant proposal emphasizes groundtruthing, this was based on the assumption that our group would be doing the base wetland mapping and we would be groundtruthing (verifying) our office mapping using air photo interpretation. As we all know, this has been done by NWI. So, we will (must!) assume that the NWI mapping shown is correct with respect to boundaries, by-and-large. This has allowed us to expand our project by preparing better basemaps using current CIR and Zim's expertise in GIS AND to gather more interesting information on the wetlands in the Helena area. We will still check boundaries if our view in the field suggests that a change is needed, but the focus of the field work will be to characterize (ie veg, soil, hydrology) specific NWI map units and to evaluate (ie conduct a limited functional assessment) a grouping of NWI units that form a logical wetland complex -- ie the units are tied together hydrologically and ecologically. [We have also noted that some large areas (ie 10 mile Creek corridor) that NWI did not find wetlands should be checked].

In a nutshell, we will be 1) doing some groundtruthing and 2) focusing on representative smaller areas to gather fairly detailed information.

Once the NWI mapping has been placed on the air photo base by Zim et al., each NWI map unit (delineation) within a Section will be given a three digit code, beginning 001, 002, 003 etc.. In the course of field work, if new areas are added onto a specific map unit or new 'separate' ones are identified, they will be draw on the map base and numbered beginning 500, 501, 502, etc.

Specific complexes (groups of NWI map units) will be outlined and targeted for field work; each complex will include a grouping of different NWI map units, 3 to 6 most likely. Each complex will be given an 'English' name. One team would then go to that complex and complete two tasks:

Using the Plot Form, the team will collect site information on each NWI unit in the complex (we will be assuming that the NWI delineation is relatively homogeneous). The attached Plot Form includes the info Jack is looking for and specific info on hydrology, soils and vegetation of the NWI unit. The data collected comes from standard wetland identification procedures but is not intended to be nor is it "a Corps of Engineers level jurisdiction delineation". Hopefully the info collected will adequately describe our local wetland types and allow the volunteers to learn how to describe wetlands, and have fun, with a minimal amount of technical training.

Once all of the specific NWI units have been visited, the Wetland Evaluation Form will be completed on the complex. The items to be evaluated are based our lengthy discussions and incorporation of a few aspects of the MT Dept. of Transportation 5/99 Assessment Method. The main topics (ie functions) to be evaluated are:

- wildlife use (threatened, endangered, sensitive species are included in this and not specifically addressed as with the MDT method)
- fish use
- recreation/education use and potential for use
- general condition/quality assessment (focusing on levels and types of disturbance occurring in the wetland complex and on lands (usually uplands) within 500 feet of the complex. The tickler list ID's possible impacts. Groundwater discharge/recharge function is actually evaluated on the Plot Form for each NWI map unit

For those familiar with the MDT method, we are not including an evaluation of the habitat for any of these parameters, just use information. I think this is important but is too complicated and is addressed to some degree in the condition evaluation.

We decided that flood attenuation evaluation would be too subjective and, therefore, unnecessarily controversial. There are other sources of info for this. [Pam's soapbox: we assume all wetlands have some inherent ability to handle flood waters (a key wetland function) which is one of the primary arguments for not destroying them]. Similarly, for the other functions addressed by MDT (and other methods), the level of expertise and knowledge needed is beyond our scope.

The goal of the Evaluation Form is to identify a few key wetland functions and conditions. We still need to discuss if giving a "rating" to each complex is needed or would help our education effort.

You will see that each information category has a "pick list" from which 1 or more items are selected. This makes the forms quite long, but they are more user friendly and the info gathered more objective. There will be one Evaluation Form for each complex visited and 3-6 or so Plot Forms that go with it that describe the NWI map units.

The field forms serve two purposes: 1) paper copy of the data with room for hand written comments and synthesis 2) and GPS/database recording. We can record almost all of the info on the forms and GPS data dictionary. Hopefully the forms are crafted and laid out in such a way as to facilitate data collection in the field both on paper and with GPS units. I'm sure there are other details that need to be worked out.

A note on recording size of wetland...If an NWI unit or a complex can be easily and completely walked around, we will "GPS" it; If not a point location will be taken. Otherwise areas will be digitized from GIS info if needed in the future.

Teams of 2-3 people plus a leader (Charles or Pam), will collect data on wetland plants, hydrology and soils.

APPENDIX 8

HELENA WETLANDS COMMUNITY PARTNERSHIP
CHECK LIST FOR FIELD GEAR

Personal Gear (hat, long sleeve shirt, boots you don't mind getting damp or soaked (if you have waders or other waterproof footwear bring along), rain gear, WATER, snack, sunblock, binocs)

Trimble GPS Unit (Charles or Pam responsible for arranging time & pick up)
Shovel or probe
Knapsack with:

- Clip board
- Pencil(s),
- Camera
- extra slide film (200 speed)
- Photo Board w/ dry erase marker
- Munsell Soil Color Book
- 2 9v batteries for GPS unit
- Magnifiers
- 6" ruler
- Compass
- 50-meter tape measure or other measuring tape or (eyeball estimate)
- Helena Valley Plant Guide
- US Fish and Wildlife Service "National List of Plant Species that Occur in Wetlands: Montana"
- Dorn's Vascular Plants of Montana
- Plot Field Forms (±10)
- Wetland Complex Forms (±2)
- CIR Air Photo with NWI units (blown-up)
- Topgraphic map with numbered NWI units and wetland complex highlighted
- Ownership information, if available
- Partnership "Fact Sheets" to hand out to landowners and curious folks as needed

PLOT FIELD FORM (7/25/99)

This form to be filled out for one NWI Map Unit

❑ *The **box** indicates that you must enter data into the GPS unit; check box on form*

****

❑ **1. Name of Wetland Complex NWI Occurs in** (Unique name assigned by Team; found on field basemap):
_____

❑ **2. Date**: MM-DD-YY ___ ___ - ___ ___ - ___ ___

3. Contact Info: Helena Wetlands: A Community Partnership, Vivian Drake 447-1668 [as default]

❑ **4. County**: Lewis & Clark [default]

❑ **5. HUC**: Hydrologic Unit Code - 8 digit # [as default] **10030101**

❑ **6. Team Leader Initials**: (Circle one) 1. PRH 2. CvH

❑ **7a. Location**: Township/Range
1. T10N/R2W
2. T10N/R3W
3. T10N/R4W
4. T11N/R2W
5. T11N/R3W
6. T11N/R4W
7. T9N/R2W
8. T9N/R3W

❑ **7b.** Section(s)
01 to 36 _____, _____
_____, _____

❑ **7c.** NWI Map Unit # (**Pick only1**)
001 to 499 _____

Was polygon changed? Yes____ No____
Briefly describe how: _____
_____

OR New polygon
500 to 599 _____

❑ **8. Take GPS *Point* Location** - GPS needs a minimum of 3 readings; no need to write # on form.

9. Describe Location of GPS Point Reading
1. In polygon (most desirable)
2. Outside of polygon (offset): If so, describe direction and approx. distance to 'get' inside polygon.
Compass bearing with declination _____ Distance (ft) _____

❑ **10. Size of Wetland (acres)**- Circle one;
1. Digitize in Office at later date _____
2. If the polygon is **new** and you can walk around it take a GPS Area_____

11. Land Ownership (Circle one)
1. Public - If you know the agency list it _____
2. Private (list below name and phone # of landowner contact(s) for land and access if needed
Name/Phone# _____
Name/Phone# _____
Name/Phone# _____

❑ **12. Source(s) of Hydrology** (circle all that apply; enter the dominant indicator in GPS; star '*'on form)
1. Precipitation
2. Runoff
3. Seasonal (< 6 mos) Ground Water Table
4. Seasonal (> 6 mos) Ground Water Table
5. Spring/Seep
6. Flooding
7. Irrigation
8. Other _____

❑ **13. Name the Source of Hydrology** (Circle Body of Water that is Source or Directly Associated w/ Wetland)
1. Spring Meadow Lake
2. Lake Helena
3. Rereg Reservoir
4. Ten Mile Creek
5. Prickly Pear Creek
6. Silver Creek
7. Unnamed tributary to _____
8. Unnamed pond
9. Unknown
10. Not applicable (none of the above)

Name of Wetland Complex NWI Occurs in :
(Unique name assigned by Team) _____ NWI Map Unit # from pg 1_____
****

❑ 14. **Field Indicator(s) of Hydrology** (Cirlce all that apply; enter the dominant indicator in GPS; star '*'on form)
1. Inundated
2. Saturated soil in the upper 12 inches
3. Water marks/drift lines
4. Sediment deposits
5. Topographic depression
6. Stream oxbow or meander bend
7. Knob and kettle
8. Other _____

Comment briefly as desired _____

❑ 15. **Has the Hydrology been Altered; If Yes, then How?:**
1. No
2. Road berm bisects or borders WL
3. Railline berm bisects or borders WL
4. WL has been filled
5. WL has been excavated or is an excavated area
6. WL has been drained by ditches, culverts, tiles, etc.
7. WL has been developed (urban/residential constru)
8. WL receives drainage from storm runoff system
9. Other (describe) _____
10. Unknown but suspect alteration

Comment briefly as desired _____

❑ 16. **Is WL a Groundwater Discharge or Recharge Area?:** (Circle & enter into GPS only 1 of 5 choices)
1. No disharge/recharge indicators present
2. **Can't Rate.** Available Discharge/Recharge information is inadequate to rate
3. Indicators that **Groundwater Discharges to WL** (Just circle all that apply; no GPS entry)
   a. Springs known and observed
   b. Vegetation growing during dormant season/drought
   c. Wetland occurs at the toe of a slope
   d. Seeps are present at the wetland edge
   e. WL is permanenltly flooded during drought periods
   f. WL contains an outlet, but no inlet
   g. Other _____
4. Indicators that **WL Recharges Groundwater** (Just circle all that apply; no GPS entry)
   a. Permeable substrate present without underlying restricting layer (ie clay lense, etc.)
   b. WL contains inlet but no outlet
5. Groundwater table fluctuates seasonally so WL is **both recharge and discharge** area

❑ 17. **Soils** (Circle only1 of 3 and enter GPS)
1. Mineral soil materials dominate the WL (small areas of organic of any depth may occur
2. Organic surface > 12" dominates the WL
3. Organic surfaceof any depth is common but does not dominate the WL (eg on the order of >10% of unit)

Comment as desired: _____

❑ 18. **Field Indicators of Wetland Soils** (Circle all that apply, enter the dominant indicator in GPS; '*' on form)
1. Sulfide odors (rotten-egg smell) - usually have to dig in the WL to test this.
2. Gleyed soil (grey, green, or blue colors)
3. Bright, reddish/brownish mottles in contrasting greyish, bluish matrix
4. Other (ie Team Leader says so!) _____

❑ 19. **Vegetative Lifeform Class** (Check all that apply, Circle **THE DOMINANT** (ie 20% cover) & enter in GPS)
1. Trees
2. Shrubs
3. Forbs
4. Grasses, sedges, rushes

Describe if there is an emerging lifeform class not indicated by NWI but can be seen on ground AND on photo
_____

Name of Wetland Complex NWI Occurs in :
(Unique name assigned by Team) _____ NWI Map Unit # from pg 1_____

****

❑ **20. Trees** (± single trunk and >20ft tall)
(Check those you observe; Circle up to 3 **dominant** species (ie 20% cover); enter dominant GPS, * on form)

a. Plains cottonwood (Populus deltoides) FAC
b. Narrow-leaf c-wood (Populus angustifolia) FAC
c. Quaking aspen (Populus tremuloides) FAC+
d. Peach-leaf willow (Salix amydaloides) FACW
e. White willow (Salix alba) FACW
f. Russian olive (Elaeagnus angustifolia) FAC
g. Box-elder (Acer negundo) FAC +
h. Wetland trees present but not dominant (<20%)
i. Other _____
j. Other _____
k. Other _____
l. No trees (or in trace amounts; <5% cover)

❑ **21. Shrubs** (Check those you observe; Circle up to 3 **dominant** species (ie 20% cover); enter dominant GPS, * on form)

a. Sandbar willow (Salix exigua) OBL
b. Bebb willow (Salix bebbiana) FACW
c. other willow species (Salix spp.) OBL or FACW
d. Water birch (Betula occidentalis) FACW
e. Shrubby cinquefoil (Potentilla fruticosa) FAC-
f. Red-osier dogwood (Cornus stolonifera) FACW
g. Alder (Alnus spp.) FACW
h. Rose (Rosa spp.) FACU
i. Snowberry (Symphoricarpos spp.) FACU
j. Wetland shrubs present but not dominant (<20%)
k. Other _____
l. Other _____
m. Other _____
n. No shrubs (or in trace amounts; <5% cover)

❑ **22. Forbs** (Check those you observe; Circle up to 3 **dominant** species (ie 20% cover); enter dominant GPS, * on form)

a. Cattail (Typha latifolia) OBL
b. Mint (Mentha arvensis) FAC
c. Simple-stem burreed (Sparganium emersum) OBL
d. Silverweed (Potentilla anserina) OBL
e. Beggar's ticks (Bidens ceruna) FACW+
f. Prickly sowthistle (Sonchus asper) FAC-
g. Watson's willow-herb (Epilobium ciliatum) FACW-
h. Licorice (Glycyrrhiza lepidota) FAC+
i. Water smartweed (Polygonum amphibium) OBL
j. Arrowgrass (Triglochin spp) OBL
k. Horsetail (Equisetum sp.) OBL to FAC
l. Broadleaf plaintain (Plantago major) FAC+
m. Wetland forbs present but not dominant (<20%)
n. Other _____
o. Other _____
p. Other _____
q. Other _____
r. Other _____
s. Other _____
t. No forbs (or in trace amounts; <5% cover)

❑ **23. Grasses** (Check those you observe; Circle up to 3 **dominant** species (ie 20% cover); enter dominant GPS, * on form)

a. Reed canarygrass (Phalaris arundanacea) FACW
b. Common reed (Phragmites australis) FACW+
c. Timothy (Phleum pratense) FACU
d. Meadow foxtail (Alopecurus pratensis) FACW
e. Manna grass (Glyceria spp.) OBL
f. Redtop (Agrostis alba) FACW
g. Kentucky bluegrass (Poa pratensis) FACU+
h. Smooth Brome (Bromus inermis) NI
i. Wetland grasss present but not dominant (<20%)
j. Other _____
k. Other _____
l. Other _____
m. Other _____
n. Other _____
o. Other _____
p. No grasses (or in trace amounts; <5% cover)

❑ **24. Sedges** (triangular flowering stem)
(Check those you observe; Circle up to 3 **dominant** species (ie 20% cover); enter dominant GPS, * on form)

a. Beaked sedge (Carex utriculata (rostrata)) OBL
b. Water sedge (Carex aquatilis) OBL
c. Wetland sedges present but not dominant (<20%)
d. Other wetsite sedges (Carex spp). _____
e. No sedges (or in trace amounts; <5% cover)

Name of Wetland Complex NWI Occurs in :
(Unique name assigned by Team) _____ NWI Map Unit # from pg 1_____

****

❑ **25. Rushes** (round flowering stem)
(Check those you observe; Circle up to 3 **dominant** species (ie 20% cover); enter dominant GPS, * on form)

a. Baltic rush (Juncus balticus) OBL
b. Spike rushes (Eleocharis spp.) OBL
c. Hardstem bulrush (Scirpus acutus) OBL
d. Small-fruited bulrush (Scirpus microcarpus) OBL
e. Wetland rushes present but not dominant (<20%)
f. Other wetsite rushes _____
g. No rushes (or in trace amounts; <5% cover)

❑ **26. State-Listed Noxious Weeds** (there are 15)
(Circle all that apply no matter the coverage; enter dominant answer GPS, * on form

a. Leafy spurge (Euphorbia ursula) NI
b. Canada thistle (Cirsium arvense) FACU+
c. Purple loosestrife (Lythrum salicaria) OBL
d. Spotted knapweed (Centaurea maculosa) NI
e. Whitetop(Cardaria draba) not isted
f. Noxious weeds present but not dominant (<20%)
g. Other _____
h. Other _____
i. Other _____
j. No noxious weeds at all. Yeah!

Comment briefly as desired _____

❑ **27. Is the area being evaluated a wetland?** 1. Yes_____ 2. No _____

❑ **28. Estimate the % of the Polygon Area that is Wetland, if possible.**

a. 0-25%
b. 26-50%
c. 51-75%
d. 76-100%

Describe how wetland and upland components occur in relationship to each other: _____
_____

❑ **29. HGM (Hydrogeomorphic) Class** Circle one and enter GPS (See key on p. 41 of Plant Guide)

1. Mineral Soil Flats
2. Organic Soil Flats
3. Riverine (non-perennial)
4. Riverine (upper perennial)
5. Riverine (lower perennial)
6. Lacustrine Fringe
7. Depression (closed)
8. Depression (open, groundwater)
9. Depression (open, surface water)
10. Slope

❑ **30. Cowardin Class** Circle one and enter 1 of 15 into GPS (See classifications on p. 42 of Plant Guide)

1. Lacustrine, Littoral, Aquatic bed
2. Lacustrine, Littoral, Unconsolidated Shore
3. Lacustrine, Littoral, Unconsolidated Bottom
4. Palustrine, Aquatic bed
5. Palustrine, Emergent
6. Palustrine, Scrub-shrub
7. Palustrine, Forested
8. Palustrine, Unconsolidated Bottom (open water)
9. Palustrine, Unconsolidated Shore
10. Riverine, Lower Perennial, Unconsolid. Bottom (open water)
11. Riverine, Lower Perennial, Unconsolidated Shore
12. Riverine, Upper Perennial, Unconsolid. Bottom (open water)
13. Riverine, Upper Perennial, Unconsolidated Shore
14. Riverine, Intermittent, Streambed
15. Other _____

❑ **31. Does Cowardin Class (Item 30) match the NWI Polygon designation?** 1. Yes ___ 2. No ___
Comment briefly as to why not _____

32. ON THE BACK - Please Briefly Describe the WL Polygon; provide other Comments as Desired; Draw a picture if it would help. Note photos by roll, frame, and briefly descibe the scene. Also, keep track of wildlife, bird, etc. sightings and sign and other comments that will be used when we assess the wetland complex (refer to the form):

WETLAND COMPLEX FIELD FORM (6/21/99)

*The **box** indicates that you must enter data into the GPS unit; check box on form*

❑ **1. Name of Wetland Complex**: (Unique name assigned by Team)

_____

****

❑ **2. Date**: MM-DD-YY ___ ___ - ___ ___ - ___ ___

3. Contact Info: Helena Wetlands: A Community Partnership, Vivian Drake 447-1668 [as default for GPS entry]

❑ **4. County**: Lewis & Clark [as default for GPS entry]

❑ **5. HUC**: Hydrologic Unit Code - 8 digit # [as default] **10030101**

❑ **6. Team Leader Initials**: (Circle one) 1. PRH 2. CvH

❑ **7a. Location**: Township/Range

1. T10N/R2W
2. T10N/R3W
3. T10N/R4W
4. T11N/R2W
5. T11N/R3W
6. T11N/R4W
7. T9N/R2W
8. T9N/R3W

❑ **7b. Section(s)**

List all but Enter dominant

01 to 36 _____, _____, _____, _____

7c.NWI Map Unit # (list all)

001 to 499 ____ , ____ , ____ , ____ ,
____ , ____ , ____ , ____ ,
____ , ____ , ____ , ____ ,
____ , ____ , ____ , ____ ,
____ , ____ , ____ , ____ ,
____ , ____ , ____ , ____ ,

500 to 599 ____ , ____ , ____ , ____ ,
____ , ____ , ____ , ____ ,

Wildlife/Fisheries Use Evaluation

❑ **8. Large 'Charismatic' Mammals** (White-tailed deer, mule deer, antelope, moose, bear, fox, etc.) Pick 1 of 5

1. One or more critters **observed** in or very near-by at time of survey **or** known to occur by other sources
   List the species _____
2. Occurrence expected based on **sign observed** (tracks, scat, bedding areas, dens, nests, etc.)
3. Occurrence expected based on **habitat present** (includes supporting, adjacent upland habitat)
4. Species Group not expected to use the area on a regular basis

Comments: _____

❑ **9. Small Mammals** (chipmunk, squirrel, pocket gopher, prairie dog, voles, mice, etc.) Pick 1 of 5

1. One or more critters **observed** in or very near-by at time of survey **or** known to occur by other sources
   List the species _____
2. Occurrence expected based on **sign observed** (tracks, scat, bedding areas, dens, nests, etc.)
3. Occurrence expected based on **habitat present** (includes supporting, adjacent upland habitat)
4. Species Group not expected to use the area on a regular basis

Comments: _____

❑ **10. Furbearers** (muskrat, beaver) Pick 1 of 5

1. One or more critters **observed** in or very near-by at time of survey **or** known to occur by other sources
   List the species _____
2. Occurrence expected based on **sign observed** (tracks, scat, bedding areas, dens, nests, etc.)
3. Occurrence expected based on **habitat present** (includes supporting, adjacent upland habitat)
4. Species Group not expected to use the area on a regular basis

Comments: _____

❑ **11. Raptors** (hawks, falcons, eagles, vultures, osprey, etc.) Pick 1 of 5

1. One or more critters **observed** in or very near-by at time of survey **or** known to occur by other sources
   List the species _____
2. Occurrence expected based on **sign observed** (tracks, scat, bedding areas, dens, nests, etc.)
3. Occurrence expected based on **habitat present** (includes supporting, adjacent upland habitat)
4. Species Group not expected to use the area on a regular basis

Comments: _____

Name of Wetland Complex: (Unique name assigned by Team) _____
****

❑ **12. Waterfowl** (very broadly defined: loons, ducks, geese, pelicans, grebes, etc.) Pick 1 of 4
1. One or more critters **observed** in or very near-by at time of survey **or** known to occur by other sources
   List the species _____
2. Occurrence expected based on **sign observed** (tracks, scat, bedding areas, dens, nests, etc.)
3. Occurrence expected based on **habitat present** (includes supporting, adjacent upland habitat)
4. Species Group not expected to use the area on a regular basis

Comments: _____
_____

❑ **13. Cranes, Herons, Egrets, Coots, Rails** Pick 1 of 4
1. One or more critters **observed** in or very near-by at time of survey **or** known to occur by other sources
   List the species _____
2. Occurrence expected based on **sign observed** (tracks, scat, bedding areas, dens, nests, etc.)
3. Occurrence expected based on **habitat present** (includes supporting, adjacent upland habitat)
4. Species Group not expected to use the area on a regular basis

Comments: _____
_____

❑ **14. Shorebirds** (avocet, plovers, sandpipers & curlews, upland sandpipers, snipe, phalarope) Pick 1 of 4
1. One or more critters **observed** in or very near-by at time of survey **or** known to occur by other sources
   List the species _____
2. Occurrence expected based on **sign observed** (tracks, scat, bedding areas, dens, nests, etc.)
3. Occurrence expected based on **habitat present** (includes supporting, adjacent upland habitat)
4. Species Group not expected to use the area on a regular basis

Comments: _____
_____

❑ **15. Gulls and Terns** Pick 1 of 4
1. One or more critters **observed** in or very near-by at time of survey **or** known to occur by other sources
   List the species _____
2. Occurrence expected based on **sign observed** (tracks, scat, bedding areas, dens, nests, etc.)
3. Occurrence expected based on **habitat present** (includes supporting, adjacent upland habitat)
4. Species Group not expected to use the area on a regular basis

Comments: _____

❑ **16. Owls and Nighthawks** Pick 1 of 4
1. One or more critters **observed** in or very near-by at time of survey **or** known to occur by other sources
   List the species _____
2. Occurrence expected based on **sign observed** (tracks, scat, bedding areas, dens, nests, etc.)
3. Occurrence expected based on **habitat present** (includes supporting, adjacent upland habitat)
4. Species Group not expected to use the area on a regular basis

Comments: _____
_____

❑ **17. Woodpeckers** Pick 1 of 4
1. One or more critters **observed** in or very near-by at time of survey **or** known to occur by other sources
   List the species _____
2. Occurrence expected based on **sign observed** (tracks, scat, bedding areas, dens, nests, etc.)
3. Occurrence expected based on **habitat present** (includes supporting, adjacent upland habitat)
4. Species Group not expected to use the area on a regular basis

Comments: _____
_____

Name of Wetland Complex: (Unique name assigned by Team) _____
****

❑ **18. Upland Game Birds** (partridge, grouse, pheasant, dove, etc.) Pick 1 of 4
1. One or more critters **observed** in or very near-by at time of survey **or** known to occur by other sources
   List the species _____
2. Occurrence expected based on **sign observed** (tracks, scat, bedding areas, dens, nests, etc.)
3. Occurrence expected based on **habitat present** (includes supporting, adjacent upland habitat)
4. Species Group not expected to use the area on a regular basis

Comments: _____
_____

❑ **19. Songbirds** (essentially any other birds: hummers, swift, kingfisher, all the perching birds, etc.) Pick 1 of 4
1. One or more critters **observed** in or very near-by at time of survey **or** known to occur by other sources
   List the species _____
2. Occurrence expected based on **sign observed** (tracks, scat, bedding areas, dens, nests, etc.)
3. Occurrence expected based on **habitat present** (includes supporting, adjacent upland habitat)
4. Species Group not expected to use the area on a regular basis

Comments: _____
_____

❑ **20. Amphibians and Reptiles** (frogs, toads,salamanders, snakes, lizards, etc.) Pick 1 of 4
1. One or more critters **observed** in or very near-by at time of survey **or** known to occur by other sources
   List the species _____
2. Occurrence expected based on **sign observed** (tracks, scat, bedding areas, dens, nests, etc.)
3. Occurrence expected based on **habitat present** (includes supporting, adjacent upland habitat)
4. Species Group not expected to use the area on a regular basis

Comments: _____
_____

❑ **21. Bats** Pick 1 of 4
1. One or more critters **observed** in or very near-by at time of survey **or** known to occur by other sources
   List the species _____
2. Occurrence expected based on **sign observed** (tracks, scat, bedding areas, dens, nests, etc.)
3. Occurrence expected based on **habitat present** (includes supporting, adjacent upland habitat)
4. Species Group not expected to use the area on a regular basis

Comments: _____
_____

❑ **22. Fish** Pick 1 of 4
1. One or more critters **observed** in or very near-by at time of survey **or** known to occur by other sources
   List the species _____
2. Occurrence expected based on **sign observed** (tracks, scat, bedding areas, dens, nests, etc.)
3. Occurrence expected based on **habitat present** (includes supporting, adjacent upland habitat)
4. Species Group not expected to use the area on a regular basis

Comments: _____
_____

❑ **23. Is this wetland complex *essential or critical* habitat to one or more species noted above?**
1. No _____ 2. Not sure, possibly, needs more inquiry _____ 3. Yes _____

If yes, list the species: _____
Comments: _____
_____

Name of Wetland Complex: (Unique name assigned by Team)_____

****

24. GENERAL CONDITION/QUALITY ASSESSMENT OF WETLAND (Circle and enter 1 of 9)			
	Predominant conditions of land adjacent to (within 500 feet of) wetland		
Conditions in the Wetland	Land managed in predominantly natural state; not grazed, hayed, or otherwise converted; does not contain roads or buildings	Land not cultivated, but moderately grazed or hayed, or has been subject to minor clearing; contains few roads or buildings	Land cultivated or heavily grazed or subject to substantial fill placement, grading, clearing, or hydrological alteration; high road or building density.
WL is managed in predominantly natural state; not grazed, hayed, or otherwise converted; does not contain roads or buildings	1. low disturbance	2. low disturbance	3. moderate disturbance
WL not cultivated, but moderately grazed or hayed, or has been subject to minor clearing; contains few roads or buildings	4. moderate disturbance	5. moderate disturbance	6. high disturbance
WL cultivated or heavily grazed or subject to substantial fill placement, grading, clearing, or hydrological alteration; high road or building density.	7. high disturbance	8. high disturbance	9. high disturbance

Describe type of disturbance, extent of encroachment, intensity, season, etc; you may find other disturbances that should be noted. See Tickler List below and draw on data collected for polygons

"A Tickler List" - Alterations/activities in wetland area that may influence it's function/condition

1. horse grazing
2. cattle grazing
3. sheep grazing
4. other livestock use: list _____
5. livestock concentration area (watering, feeding, calving, over wintering)
6. Wildlife browsing
7. wildlife concentration area
8. trash in wetland (garbage, tires, car body parts, etc.)
9. wetland is filled-in whether intentionally or not
10. wetland is drained or partially drained by ditches or drain tiles
11. road bisects or borders wetland
12. dikes/levee bisect or borders wetland
13. railroad bisects or borders wetland
14. wetland is impounded by dam
15. wetland tracked by vehicle/ATV, etc.
16. wetland is excavated
17. other _____
18. other _____
19. other _____

Name of Wetland Complex: (Unique name assigned by Team) _____
****

❑ **25. Recreation Use and Potential for Use**
1. Is WL and/or surrounding area used for recreation? List use(s): _____
2. Could WL and/or surrounding area is used for recreation? List use(s): _____
3. No potential for recreational use.

❑ **26. Education Use and Potential for Use**
1. Is WL and/or surrounding area used for education? List use(s): _____
2. Could WL and/or surrounding area is used for education? List use(s): _____
3. No potential for educational use.

❑ **27. Does Wetland Complex possess scenic or open space values?** Team's subjective opinion.
1. No _____
2. Yes _____ If yes, briefly describe why: _____

❑ **28. Does this Wetland Complex have the potential for restoration or enhancement?**
1. No _____
2. Yes ____ If yes, describe why: _____
_____
_____

Photos: Take a photo or two and briefly describe orientation and what you are trying to capture. Please note photo # by Team Leader, Roll, Frame: ie H-1-20, V-3-14.

_____
_____
_____
_____

Summary: Please provide a written summary of the attributes of this wetland complex; utilize the information gathered for each polygon and on this form to help guide you. Draw a picture if that would be helpful.

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Field Guide to Wetland Plants in the Helena Valley

Helena Wetlands Community Partnership Project

The Helena Wetlands Community Partnership expressly thanks Bob Logan and Gary Ellingson with the Montana Forest Stewardship Program, MSU Forestry Extension, for permission to reprint many of the plant fact sheets from "Important Riparian & Wetland Plants that Every Forest Steward Should Know"(7/8/97) used in this guide. You will note that we also borrowed the excellent format for the fact sheets we developed for plants common in our area. To learn more about the Montana Forest Stewardship Program, call (406) 243-2773.

Many thanks to those who compiled this guide - Pam Hackley, Charles van Hook, Lisa Fairman, Amy Zarrett, and Susan Lenard. Also, thanks to the dedicated Last Chance Audubon Society volunteers and others who have made editing suggestions and put this guide to rigorous field testing.

The Helena Wetlands Community Partnership is made up of Helena area professionals, local government agencies and nonprofit organizations. Specifically, the partners forming this project include:

Lewis & Clark County Water Quality Protection District
Lewis & Clark County Planning Department
Lewis & Clark County Information and Technology Services
Montana Audubon
Last Chance Audubon Society
Montana Wetlands Trust
Pam Hackley, Consulting Soil Scientist

Citizen volunteers and landowners are also involved in information gathering and public outreach.

This two-year project is funded by a Wetland Protection Program grant from the Environmental Protection Agency and administered by the Montana Department of Environmental Quality.

For more information on this community project, please call:

Susie Palermo, Lewis & Clark County Water Quality Protection District, 457-8927
Janet Ellis or Susan Lenard, Montana Audubon, 443-3949 or
Pam Hackley, Consulting Soil Scientist, 449-0424

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KEY FOR SELECTED PLANTS IN THE HELENA VALLEY ASSOCIATED WITH OR FOUND NEAR WETLANDS

Prepared for the Helena Wetlands Community Partnership (6/29/99)

KEY TO LIFEFORMS

1.	Plants with woody trunks or stems, to the base.	go to 2a, 2b
1.	Plants not woody but herbaceous; annual or perennial (typically lives more than 3 years); plants that die back to the ground at the end of the growing season.	3
2a.	A perennial woody plant with usually one (but sometimes several) stiff, upright main stem (trunk). For this project, also over 20 feet tall (so if tree is <20 ft go to Shrubs, 2b).	go to **Trees**
2b.	A perennial woody plant usually having several flexible, more or less upright stems that typically branch near the ground; less than 20 feet tall.	go to **Shrubs**
3.	Herbaceous plants other than grasses or grass-like plants; usually with flowers having obvious petals (*there are exceptions to these generalizations! eg arrowgrass, hosretail*)	go to **Forbs**
3.	Herbaceous plants that are grasses or grass-like (sedge family and rushes); these plants have flowers but the flower parts appear distinctively different from those we associate with more showy flowers.	go to **4**
4.	Leaves found in alternate arrangement along on the flowering stem but sometimes *appearing* reduced, only very rarely absent	go to **Grasses**
4.	Leaves ranked on the stem in three's, coming from the base, or are very reduced to absent	go to 5
5.	Stem that bears the flower(s) are slightly flattened, hollow, and twisted; upon close examination, flowers have petals and sepals but are very small (all rushes (genus *Juncus*) are Obligates, FACW, or FAC indicators)	**Baltic rush** p. 13
5.	Stem that bears the flower(s) is round or triangular in cross-section, solid (pithy)	go to **Sedges**

KEY TO TREES

1.	Leaves longer than wide (e.g. linear, lanceolate, elliptic).	go to 2	
1.	Leaves more or less as long as wide (e.g. round, triangular).	go to 3	
2.	Leaves with entire (smooth) margins	Russian olive,	p.36
2.	Leaf margins not entire but wavy, serrated, dentate for example	go to 2a, 2b	
	2a. Leaves green above, whitish w/waxy coating below; long, narrow tip	Peach-leaf willow,	p.38
	2b. Leaves green above and below, leaf tip comes to a point	Narrowleaf cottonwood,	p.37
3.	Leaf blades roundish, sometimes heart-like, bark typically smooth, white.	Quaking aspen	p.39
3.	Leaf blades broadly triangular (deltoid) with wavy margin, bark rough and ridged.	Plains cottonwood	p.40

KEY TO SHRUBS

1.	Leaf blade divided into more than 1 discreet segments (leaflets), stems not thorny.	Shrubby cinquefoil	
1.	Leaf blade composed of 1 segment (simple), but may have indentations.	go to 2	
2.	Leaves clearly paired on **opposite** sides of stem	go to 3	
2.	Leaves arranged **alternately** along stem, sometimes appearing opposite or whorled	go to 4	
3.	Leaves 3-6 in. long, veins are prominent and parallel to leaf edge, stems bright red; shrub 4-15 ft. tall	Red-osier dogwood	p.30
3.	Leaves 1-2 in. long (mostly), medium green; low shrub usually in dense patches	Snowberry	p.31
4.	Leaves clearly longer than wide (e.g. linear, lanceolate, elliptic); margins entire.	go to 5	
4.	Leaves more or less as long as wide (e.g. round, triangular); margins serrate; fruit is small cone.	go to 6	
5.	Leaves **very** slender, equally green on both sides; young twigs greenish or yellowish, smooth; overall shape of shrub appears as many flexible stems to 9 ft tall.	Sandbar willow	p.32

5. Leaves lance-like to elliptic, green above, whitish (due to waxy coating) below (early season also with hairs); twigs generally reddish, somewhat hairy; overall shape is roundish shrub to multi-stemmed small tree. (Remember there are over 25 willow species in Montana! The natives we will encounter are OBL , FACW)	Bebb willow	p. 33
6. Buds are somewhat inconspicuous, pointed and sit in axis between leaf stem and twig; cones are long and narrow.	Water birch	p.34
6. Buds are prominent, rounded, blunt and sit on a short stalk; cones are roundish, hard.	Mountain alder	p.35

KEY TO FORBS

1. Plants clearly aquatic (floating or rooted in water most of growing season)	go to 2	
1. Plants not aquatic but could occur in standing water during part of growing season)	go to 3	
2. Plants floating usually appearing as pale green sheet on quiet water; leaves small, arranged singly or in paired lobes that taper to a narrow stalk	Duckweed	p.14
2. Plants variously rooted; leaves float on surface or submersed	go to 2a, 2b	
2a. Leave long and ribbon-like, creased along midrib near base, closely overlapping along flower stalk; flowers pale green to white in dense globose clusters arranged severally along stalk	Simple-stem burreed	p.15
2b. Leaf margins entire; leaves elliptic to lance-like with a stem; flowers bright pink, in one dense, cone-shaped cluster at end of stem	Water smartweed	p.16
3. Leaves not on flowering stems and also apparently lacking	go to 4	
3. Leaves obviously present, arising from base of plant and/or arranged along flowering stem	go to 5	
4. Plants occur as numerous stems without flowers or leaves (sometimes leaf-like branches occur as whorls at stem nodes; spore bearing cone sits on top of stem; stems hollow.	Horsetail	p.17
4. Plants with tall leafless stems; leaves from base generally short, and narrow, sometimes lacking entirely; flowers inconspicuous, arranged singly along the stem (2 other species have more conspicuous leaves)	Marsh arrow-grass	p.18
5. Leaf blade divided into many, odd-numbered discreet segments (leaflets), arranged *nearly* opposite with one leaflet at end of stem, leaflets smooth or with long silky hairs above; with dense, short, white hairs below; plant low with solitary, flowers with 5 yellow petals	Silverweed	p.19
5. Leaf blade composed of 1 segment (simple), but may have indentations.	go to 6	
6. Leaves arranged alternately along stem, sometimes appearing opposite or whorled	go to 7	
6. Leaves clearly paired on opposite sides of stem	go to 11	

<u>Leaves Alternate</u>

7. Flowers are tiny, packed into dense clusters along stalk	go to 8a, 8b	
7. Flowers small (or not) but conspicuous	go to 9	
8a. Plants tall, typically growing in dense patches; flowers in very dense, hard cylindar at end of stalk; leaves many, long and wide, arising from the base of the plant	Cattail	p.20
8b. Plants low, occurring singly usually in sedge/grass meadows; flowers inconspicuous arranged singly but compactly along upper half of stalk; leaves elliptic, veins prominent, up to 10 arising from base of plant	Broadleaf plantain	p.21
9. Flowers small, yellowish-green emitting a thick, sweet small; numerous leaves, 1-4 in long along entire stem; stem emits sticky, milky sap when broken	Leafy spurge	p.24
9. Flowers white or yellow; features not as described above	go to 10a, 10b	

10a. Flowers numerous, white, w/5 petals giving a flat-topped appearance; leaves dull green, lance-like with slightly wavy margins; lower lvs have a short stem, upper lvs have base lobes that clasp the stalk; plant 0.5-2 ft tall	Whitetop	p.23
10b. Flowers yellow, several, but singly borne at ends of short flowering stalks; leaves green, somewhat lobed with prominent mid-vein; margins very wavy, spine-tipped, clearly clasping stem; stem when broken emits milky juice; plant 1-5 ft tall	Spiny sowthistle	p.22

Leaves Opposite

11. Flowers borne in axis between stalk and leaf pairs	go to 12a, 12b	
11. Flowers not as above	go to 13a, 13b	
12a. Numerous pale purple to blue flowers arranged in globe; flowers are tubes with 2 lips; crushed leaves and stems very aromatic	Wild mint	p.26
12b. Paired flowers with 4 petals, 4 sepals, pink to purple; not aromatic	Watson's willow-herb	p.27
13a. Flowers borne singly at end of 1 to several stalks, yellow; leaf pairs few	Beggar's ticks	p.28
13b. Flowers in relatively dense vertical plumes from many stems, 5-7 petals, rose-purple; leaf pairs many along entire stem; plant 4-8 ft tall	Purple loosestrife	p.25

KEY TO GRASSES

1. Flowers/seedheads borne on stems that radiate in whorls from main stem	go to 2a, 2b	
1. Flowers/seedheads borne in vertical spikes, open to compact clusters	go to 3	
2a. Leaf ends folded in half; leaf tip distinctly shaped like the keel of a boat	Kentucky bluegrass	p.1
2b. Leaf tips not boat-keeled	Redtop	p.2
3. Seed heads very compact	go to 4	
3. Seed heads narrow but more open, appearing feathery	go to 6	
4. Seed head appearing fuzzy due to extreme density of tiny flowers, with short awns	Meadow foxtail	p.5
4. Seedheads appearing distinctly ranked, without awns (slender bristles)	go to 5a, 5b	
5a. Seedheads comparatively large, appearing two-ranked, very distinctive	American sloughgrass	p.3
5b. Seedhead narrow, ascending on short stems, seed parts overlapping	Small-floating mannagrass	p.4
6. Plant 2-4 ft tall with long, flat leaves up to 1 inch wide; long (0.25-0.5 in) pointed ligule (hairlike or membrane projection up from the inside of a grass leave where it meets the stem)	Reed canarygrass	p.7
6. Plant 5-9 feet tall; with many shorter leaves 0.5-2 in wide; ligule < 0.25 in high, part hairy, part membranous	Common reedgrass	p.6

KEY TO SEDGES (*p.s. only the Carex genus in the sedge family has edges!*)

1. Stem that bears the flower(s) is triangular in cross-section, with distinct edges, especially below the flowers	go to 2	
1. Stem that bears the flowers is round in cross-section	go to 4	
2. Leaves with distinct bluish cast from waxy substance (not in your booklet)	Nebraska sedge	none
2. Leaves equally green on both sides	go to 3a, 3b	
3. Plant is stout; leaves rather thick and stiff up to 0.5 in wide; flowers (perigynia) arranged in 1-2 in spikes, very inflated, attached nearly at right-angle to stem	Beaked sedge	p.8
3. Plant less robust, leaves light green, flowers also aranged in spikes but overlapping on stem	Water sedge	p.9
4. Flowers in one dense cluster at the end of leafless stem; generally less tha 2 ft tall	Creeping spike sedge	p.10
4. Flowers in many clusters a the end of stem (with or without leaves). (All of our *Eleocharis* spp. are OBL)	go to 5a, 5b	
5a. Plant 3-6 ft tall, stems robust, pithy, without leaves; many flowers compactly borne on stems at the end of the flowering stalk.	Hard-stem bulrush	p.11
5b. Plant 1-3 ft tall, stems more slender, with leaves; fewer flowers loosely borne on stems at the end of the flowering stalk. (All of our *Scirpus* spp. are OBL)	Small-fruited bulrush	p.12

Kentucky Bluegrass

Poa pratensis

Family: Grass (*Poaceae* same as *Graminae*)

What does it look like?

Leaves come off stem at 45° angle. Leaves have "boat shaped" ends. Showy, drooping seed heads. Grows to three feet tall. Perennial grass with rhizomes. Introduced from Europe.

Can be confused with:

This large grass family has many similar species.

Where is it found?

Meadows, pastures, and open forests. Spreads quickly. Becomes a weed on disturbed sites.

How is it used?

Preferred forage for cattle, horses, sheep, elk and deer. An increaser in response to over-grazing. Favored by elk and deer in the spring. One of the first grasses to green-up in the spring. Good cover for small mammals and birds. High food value for waterfowl. Sod forming rhizomes make it an excellent lawn grass.

Riparian/wetland probability:

Low Probability

FACU+

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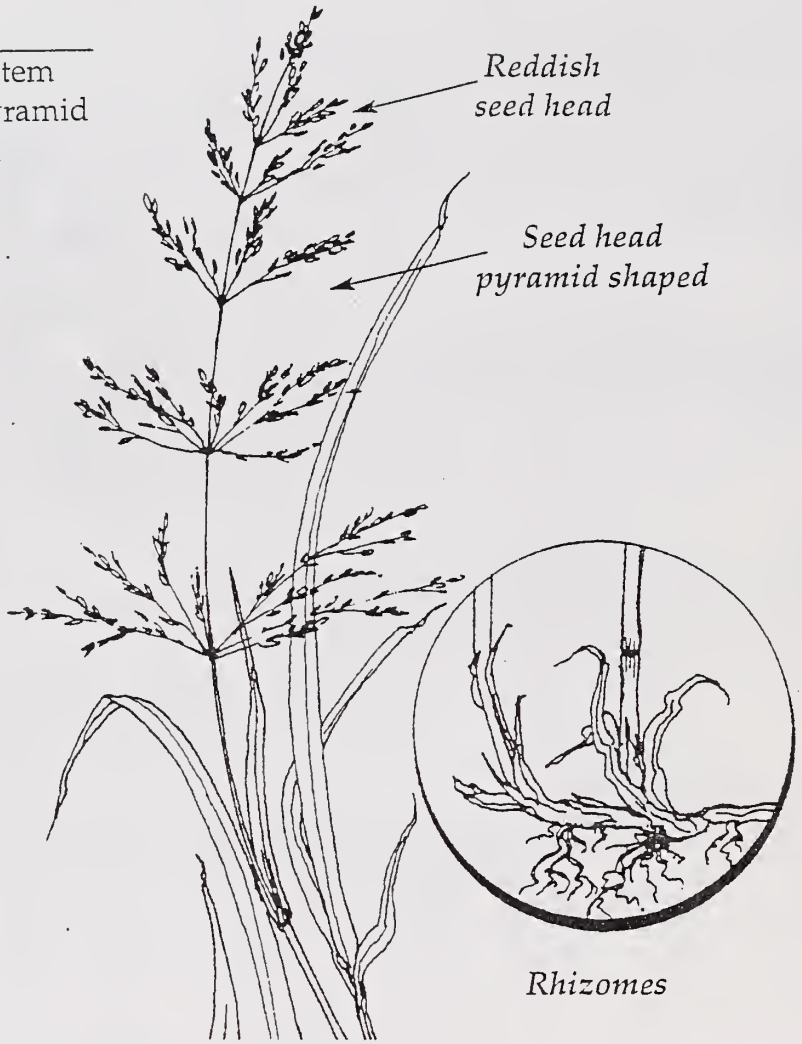
Redtop

Agrostis alba

Family: Grass (*Poaceae* same as *Graminae*)

What does it look like?

Leaves flat at base, narrow, pointed ends. Stem round, usually purple or red. Seed head pyramid shaped, reddish color. Perennial grass with rhizomes. Introduced from Europe.



Can be confused with:

Kentucky bluegrass seed heads have a similar shape. See Kentucky bluegrass (page 13).

Where is it found?

Moist areas–often along streams or ponds. Adapted to wet, acid soils. Can grow under water for short periods.

How is it used?

Preferred forage for cattle, horses, elk and deer. Desirable forage for sheep. Cover for upland game birds. Rhizomes can form dense mats. Planted in pasture, hay and lawns.

Riparian/wetland probability:

High probability; FACW

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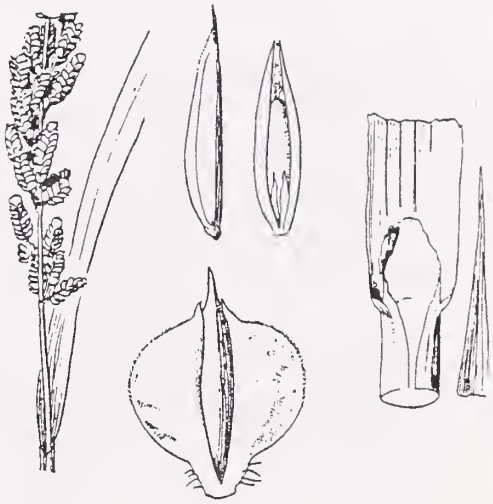
American sloughgrass

Beckmannia syzigachne

Family: Grass (*Poaceae* - same as *Graminae*)

What does it look like?

This distinctive grass has narrow spikes that consist of many crowded, 1-flowered, round spikelike structures. Leaves have flat blades 5-10 mm wide.



Can be confused with:

At first look could be confused with small-floating mannagrass, but once observed, is quite distinctive.

Where is it found?

Along streams, in marshes, around ponds and lakes, in wet roadside ditches.

Riparian/wetland Probability

Obligate Wetland plant: Almost always occur (estimated greater than 99% of the time) under natural conditions in a wetland.

Small-floating mannagrass

Glyceria borealis

Also called Northern mannagrass
Family: Grass (*Poaceae* - same as *Graminae*)

What does it look like?

This grass has elongated, spike-like stems up to 3/4 in. long, with 8-12 flowers. These narrow bodies do not have hairs.

Can be confused with:

Several other mannagrasses and American sloughgrass. Note also that several mannagrasses have the distinctly overlapping "lemmas," but the arrangement of spikelets are open, resembling blue grasses and redtop.

Where is it found?

Shallow water of ponds and lakes and in wet meadows in the mountains.

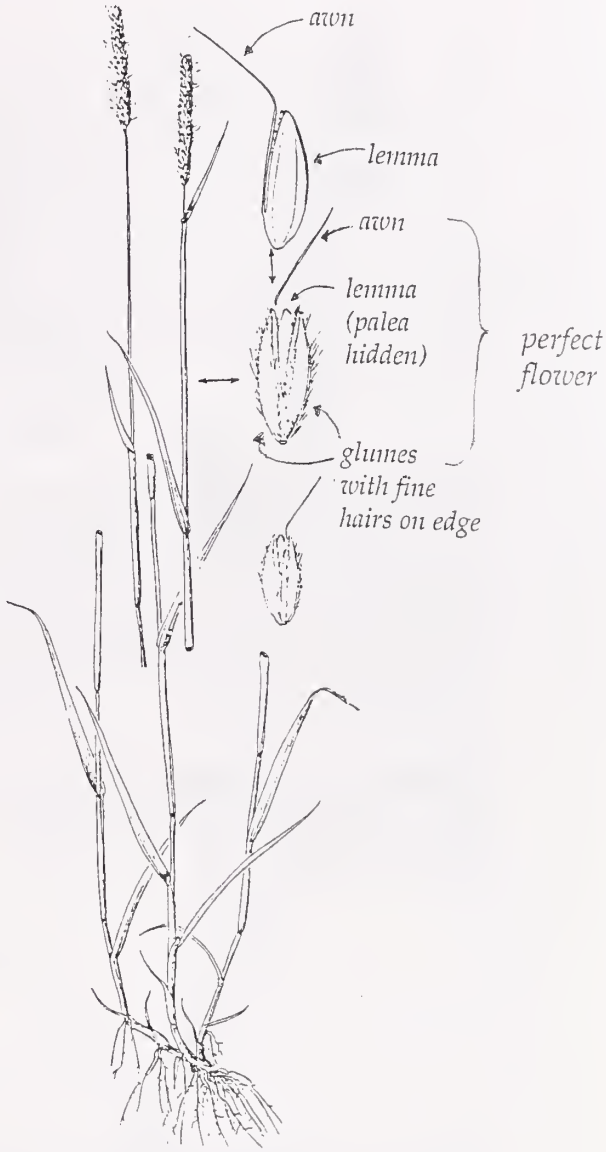
Riparian/wetland Probability

Obligate Wetland plant: Almost always occur (estimated greater than 99% of the time) under natural conditions in a wetland.

Meadow foxtail

Alopecurus pratensis

Family: Grass (*Poaceae* - same as *Graminae*)



What does it look like?

A perennial that forms loose tufts with stems, 30-90 cm (12-36 in) tall, that often root at the bottom of where the leaves and buds arise. The leaf blades are 3-10 mm wide and rough to the touch.

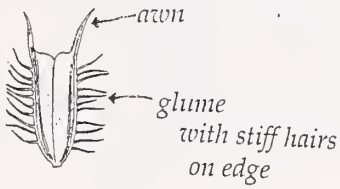
Can be confused with:

Timothy (*Phleum pratense*) which is rated FACU. Awn is stout and on glume rather than on lemma.

Where is it found?

Moist to wet meadows from the valleys to the subalpine zone.

Compare the perfect flower of Timothy (*Phleum pratense*) to that of Meadow foxtail.



Riparian/wetland Probability

Facultative Wetland plant: Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in nonwetlands.

Common reedgrass

Phragmites australis

Family: Grass (*Poaceae* - same as *Graminae*)

What does it look like?

A perennial with stems 150-300 cm (5 -10+ ft) tall. The leaves have flat blades 10-40 mm wide and fall from the plant by the end of summer. The 3- to 6-flowered spikelets are crowded on nearly erect branches of the cluster that is purplish at first but turns tawny at maturity.

Can be confused with:

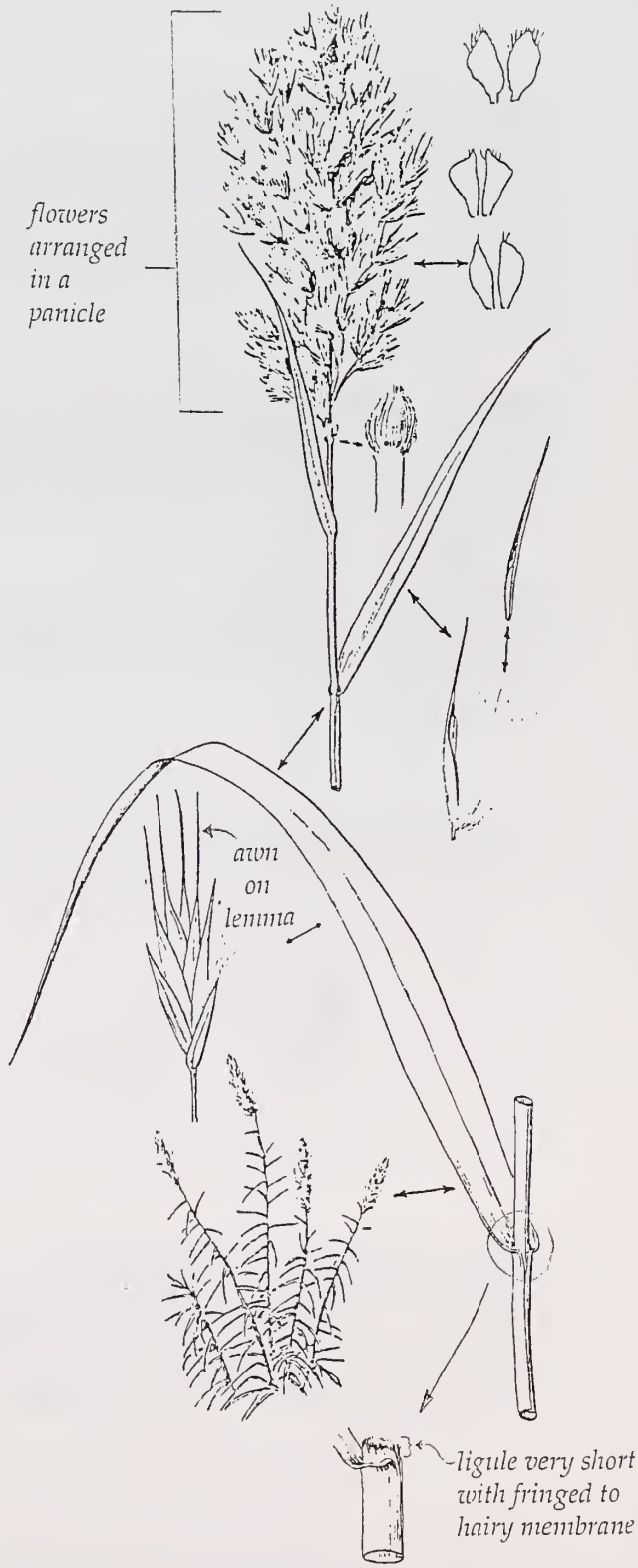
Reed canarygrass, but leathery aspect of flower panicle is very distinctive. Also note differences in ligule. The lemmas of Common reedgrass are awned while those of Reed canarygrass are not.

Where is it found?

Along stream banks, wet ditches, and some disturbed areas.

Riparian/wetland Probability

Facultative Wetland plant: Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in nonwetlands.



Reed canarygrass

Phalaris arundinacea

Family: Grass (*Poaceae* same as *Graminae*)

What does it look like?

Tall erect grass, growing to seven feet tall. A native perennial. Stems have waxy coating giving blue-green color. Flat leaf blades 1/4"–3/4" wide. Seed head long, narrow, compact.

Where is it found?

Along marshes, streams, ditches and other moist areas at low to mid elevations. Tolerates saturated soil and periodic flooding, yet withstands short summer droughts.

How is it used?

Young plants provide good forage for cattle, sheep and horses. Older plants less palatable, often used as hay. A competitive, sod-former highly competitive with other plants. Sometimes considered a weed.

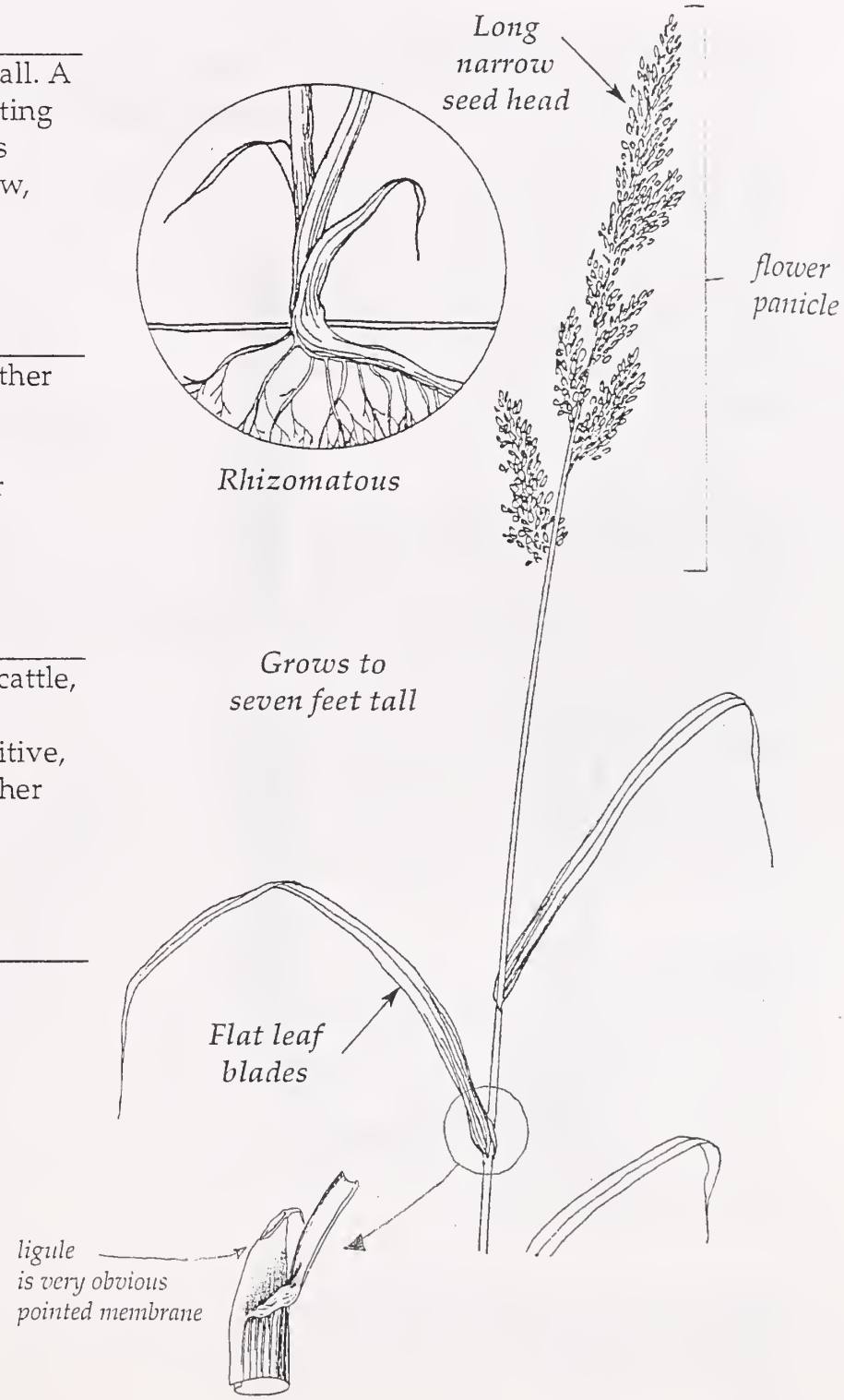
Riparian/wetland probability:

High Probability

FACW

Can be confused with:

Common reedgrass; see page 6.



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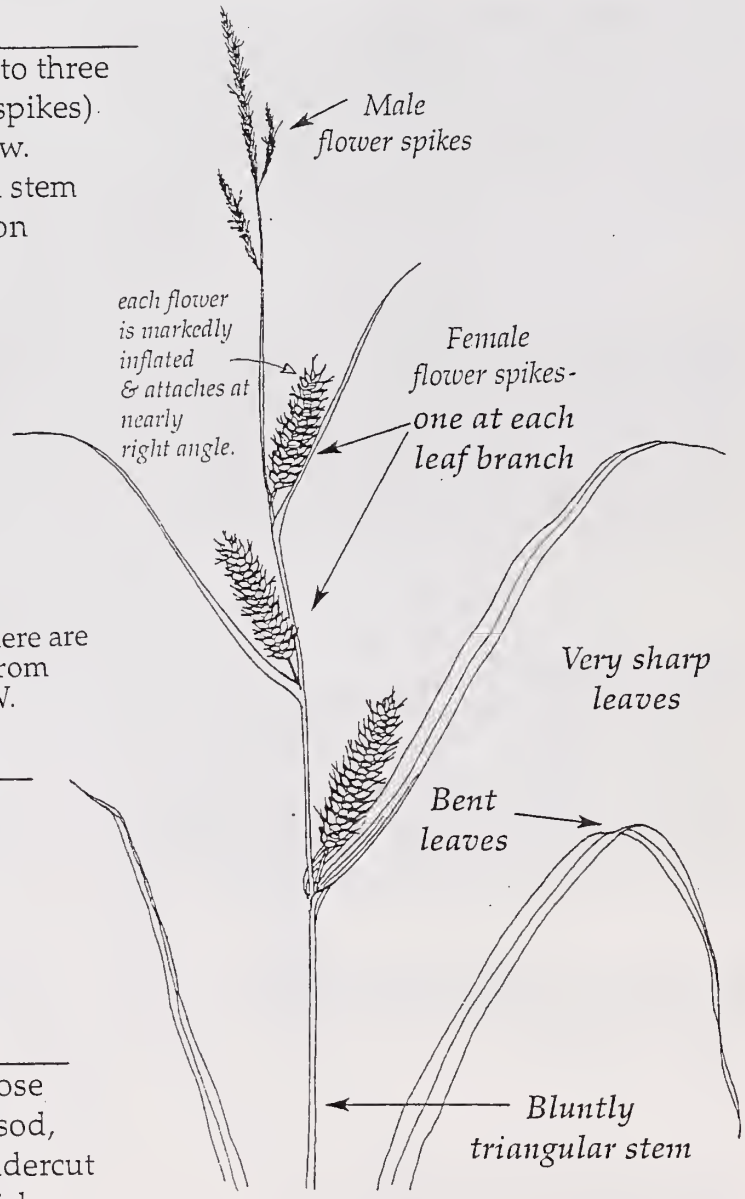
Beaked sedge

Carex rostrata

Family: Sedge (*Cyperaceae*)

What does it look like?

Stem is erect, stout, bluntly triangular. Grows to three feet tall. Two to four male flowers (staminate spikes) at top of stem are 1/2"–1 1/2" long, and narrow. Female flowers (pistillate spikes) are lower on stem and 3/4"–4" long and 1/4" across. Seed pods on female flowers are yellowish green and heart-shaped. Leaves flat toward tip, channeled below. The leaves are razor sharp and can slice your hand if rubbed backwards. Rhizomatous perennial.



Can be confused with:

Other sedges. See Water sedge (page 9) and Creeping spikesedge (page 10). Note that there are over 100 *Carex* species in Montana which range from OBL to FACU. Most, however, are OBL or FACW.

Where is it found?

Wet meadows, shallow water at margins of streams, lakes and ponds. In western and central Montana. One of our most common wetland sedges. Grows in pure stands.

How is it used?

Lightly utilized by cattle, horses, elk and moose (it can cut their tongues). Forms dense thick sod, highly resistant to erosion. Along streams undercut sod sags and provides bank protection and fish cover. Good species for improving degraded riparian conditions.

Riparian/wetland probability:

Virtually Assured
OBL

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Water sedge

Carex aquatilis

Family: Sedge (*Cyperaceae*)

What does it look like?

Triangular stem. Leaves light to whitish green, 1/8"–1/4" wide. One to three male flowers at top of plant (staminate spike) about 1/2" long. Female flower (pistillate spike), lower on plant, 1/2"–1 1/2" long. Seed pods on female flower are flattened, generally not green. Rhizomatous perennial. Grows to three feet tall.

Can be confused with:

Other sedges. See Beaked sedge (page 20) and Creeping spikesedge (page 22).

Where is it found?

Wet meadows, lake margins, stream banks in western and south-central Montana. Common at mid to high elevations.

How is it used?

Palatable for cattle and horses, moderate use by elk and deer. Waterfowl eat seeds and use for nesting and hiding cover. Forms dense sod, effectively stabilizing stream banks. Overhanging banks provide cover and shade for fish.

Riparian/wetland probability:

Virtually Assured
OBL

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Creeping spikesedge

Eleocharis palustris

Also called Common spikesedge
Family: Sedge (*Cyperaceae*)

What does it look like?

Single flower head (spikelet) at top of leafless stem. Spikelet 1/8"–1" long. Rhizomatous perennial. Grows to three feet tall.

Can be confused with:

Other sedges. See Beaked sedge (page 20) and Water sedge (page 21). The single flowerhead at top of stem is distinctive.

Where is it found?

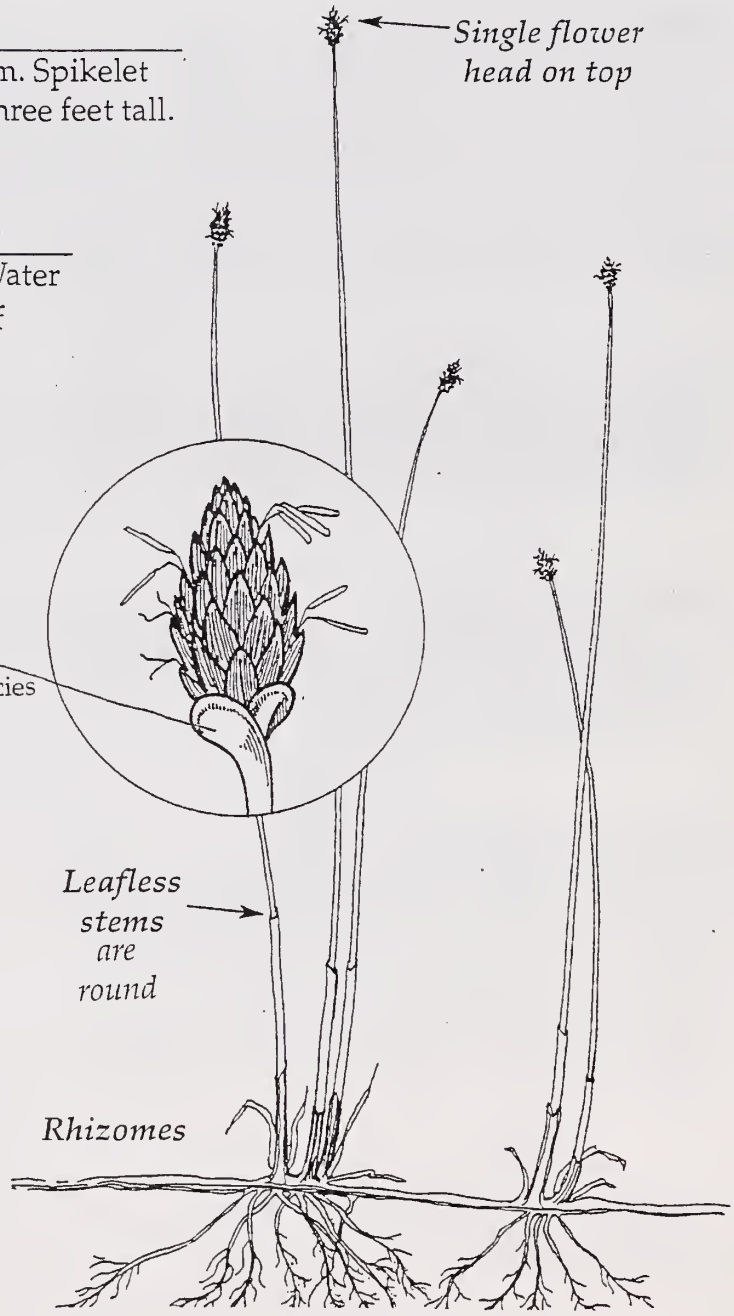
Low to mid elevations throughout Montana. Common along margins of large rivers, lakes, reservoirs, stock ponds, and internally drained basins. Alkaline tolerant.

How is it used?

Low forage value for livestock and big game. Nesting cover and food source (seeds are eaten) for waterfowl.

Riparian/wetland probability:

Virtually Assured
OBL



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Hardstem bulrush

Scirpus acutus

Family: Sedge (*Cyperaceae*)

What does it look like?

Single stem is three to six feet tall, stout, and has pithy center. Single gray-brown flower head at top of stem. Perennial with rhizomes. Forms large dense colonies.

Where is it found?

Marshes, lakes and pond margins at low to mid elevations in up to three feet of water. Alkaline tolerant.

How is it used?

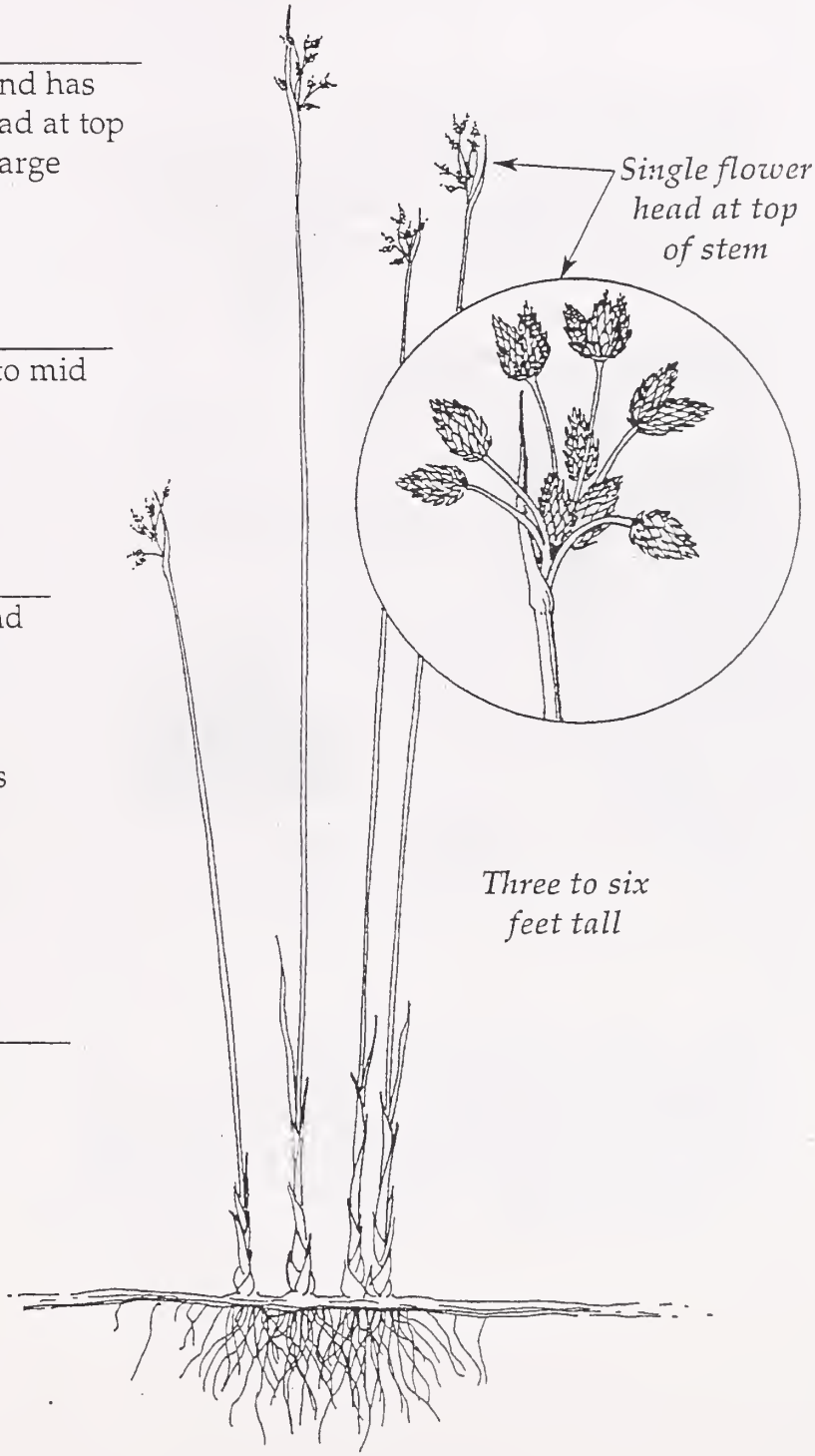
Provides erosion control by buffering wind and wave action on bodies of water. Low forage value, seldom grazed by livestock. Waterfowl such as coots, least bitterns, Canada geese use for nesting cover. Seeds eaten by variety of birds. Red winged blackbirds and marsh wrens common nearby.

Riparian/wetland probability:

Virtually Assured
OBL

Can be confused with:

Resembles other bulrushes and sedges, but height and stout nature are distinctive.



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Small-fruited bulrush

Scirpus microcarpus

Family: Sedge (*Cyperaceae*)

What does it look like?

With loosely clustered stems, this plant is 40-100 cm (16-40 in) tall. It has flat, grasslike leaves with reddish-purple at the base.

Can be confused with:

Other bulrushes and sedges.

Where is it found?

Along streams, wet ditches, and marshes.

Riparian/wetland Probability

Obligate Wetland plant: Almost always occur (estimated greater than 99% of the time) under natural conditions in a wetland.

Baltic rush

Juncus balticus

Family: Rush (*Juncaceae*)

What does it look like?

Single round stem, two to three feet tall, without noticeable leaves. Flower head on side of stem below the top. A perennial with thick, wide spreading rhizomes.
Stems tend to twist noticeably as they age.

Can be confused with:

Torrey rush has noticeable leaves and flower head is at top of stem.
Resembles some bulrushes and sedges.

Where is it found?

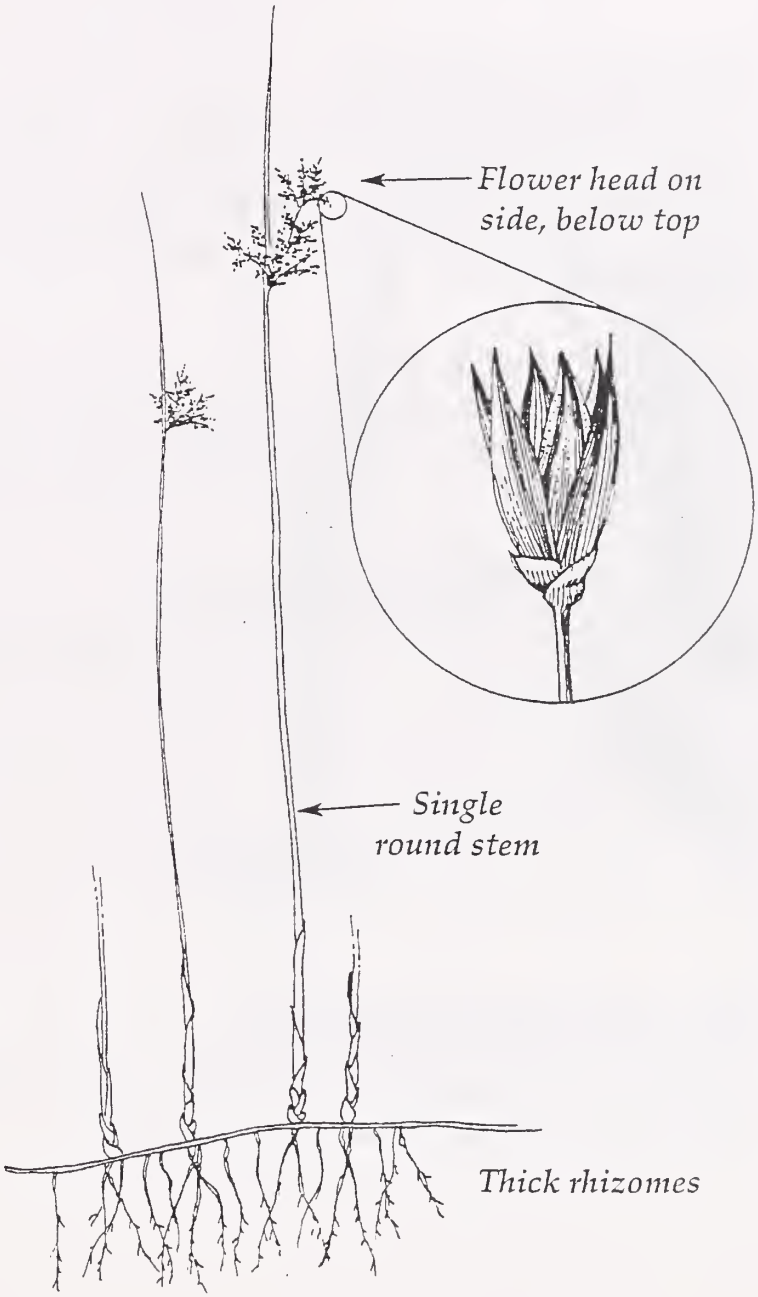
Wet or moist areas at low to high elevations.
Occurs statewide.

How is it used?

Fair forage for elk, cattle and horses, poor for deer and sheep. Most palatable when young.
Food and nesting cover for waterfowl.
Valuable for stabilizing streambanks.

Riparian/wetland probability:

Virtually Assured
OBL



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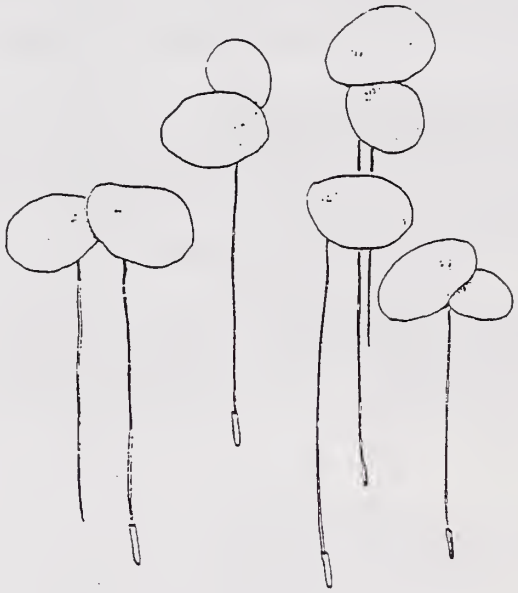
Duckweed

Lemna species

Family: Duckweed (*Lemnaceae*) - only genus in the family

What does it look like?

This is the easiest duckweed to identify because of the elliptic leaves that taper to a narrow stalk at the base. The leaves usually cohere to each other in colonies. Floating aquatic plant.



Can be confused with:

Not easily confused with other species. There are four Lemna species in Montana, all floating aquatics.

Where is it found?

Quiet waters of streams, lakes, ponds, and ditches.

Riparian/wetland Probability

Obligate Wetland plant: Almost always occur (estimated greater than 99% of the time) under natural conditions in a wetland.

Simple-stem bur-reed

Sparganium emersum

Also called Narrow-leaf bur-reed
Family: Bur-reed (*Sparganiaceae*) - only genus in the family

What does it look like?

Slender stems 25-70 cm (10-28 in) tall, that float on the water or lie in the mud. Flat, ribbonlike leaves are broad at the base and as long as the stems. (Also called Narrow-leaf bur-reed).

Can be confused with:

Not easily confused with other species. There are five bur-reed species in Montana. All are obligate wetland plants. The other four are not likely to occur in our study area.

Where is it found?

Shallow water of marshes, ponds, and sloughs in valleys.

Riparian/wetland Probability

Obligate Wetland plant: Almost always occur (estimated greater than 99% of the time) under natural conditions in a wetland.

Water smartweed

Polygonum amphibium

Family: Buckwheat (*Polygonaecea*)

What does it look like?

Although it is highly variable, the stalk is usually smooth to partly hairy. Leaves are long and lance-shaped. The bright pink or red flowers , 4-5 mm long, are tightly packed into an egg- to cone-shaped cluster less than 40mm long.

Can be confused with:

There are many *polygonum* species but the tight showy flower head occurs on only 2 other species (one FAC, one FACW). Can also be confused with pondweeds (*Potamogeton*) with lance-like shaped leaves, but veins are distinctly parallel to leaf edge in pondweeds and possibly plantain.

Where is it found?

Found floating in marshes and river sloughs.

Riparian/wetland Probability

Obligate Wetland plant: Almost always occur (estimated greater than 99% of the time) under natural conditions in a wetland.

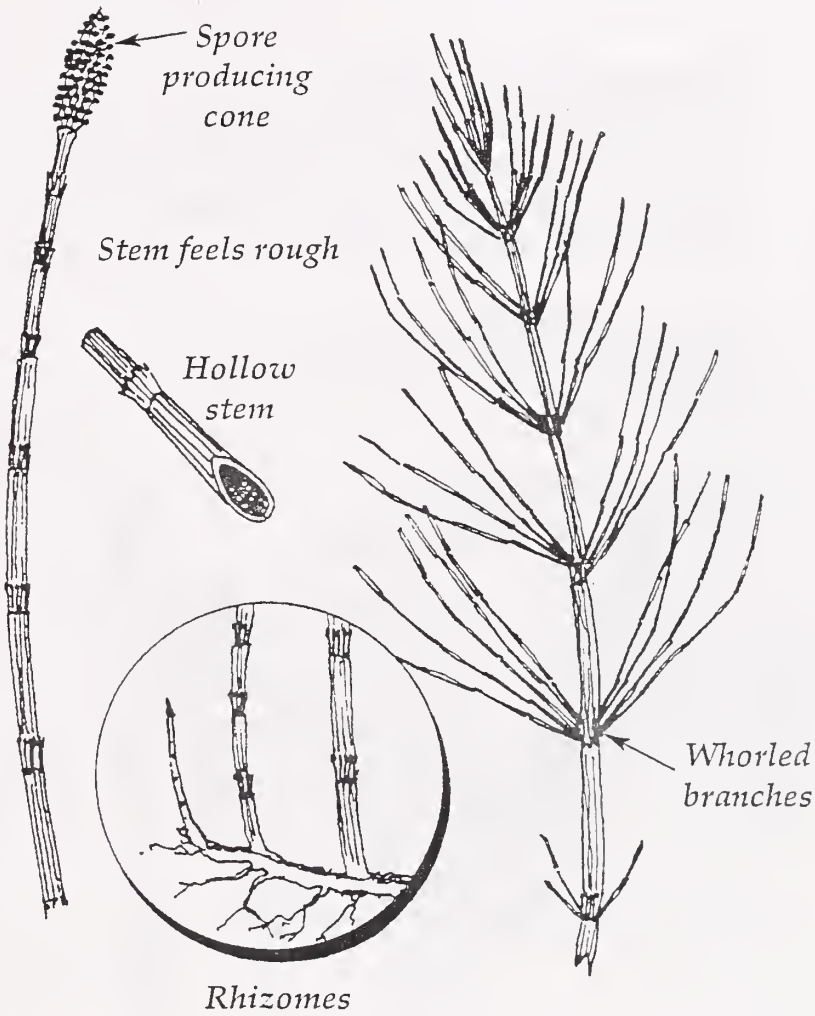
Field horsetail

Equisetum arvense

Also called Horsetail rush
Family: Horsetail (*Equisetaceae*) - only genus in the family

What does it look like?

A native, perennial rush with rhizomes. Has two types of stems: 1) A fertile, cone-bearing stem grows in early spring, is flesh colored, and grows 6"–12" tall. 2) A sterile or vegetative stem grows after the fertile stem, is 1 1/2'–2' tall, with many whorls of slender green, jointed branches. Stems are hollow, rough to the touch. No true flowers. Reproduces by spores.



Can be confused with:

Scouring rush, produces only simple, hollow, jointed stems, with cones. Has no vegetative stems with whorled branches.

Where is it found?

Grows primarily in moist areas with high water tables. Prefers sandy or gravelly soils, as found on many creek banks.

How is it used?

Undesirable forage for cattle, horses, sheep, elk and deer. Reported to be poisonous, if fed in large quantities, in dry hay. Contains large amounts of silica; abrasive stems were used for scouring and as sandpaper by early Native Americans.

Riparian/wetland probability:

50/50 Chance
FAC - other horsetail spp. in our area are FACW or OBL

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Marsh arrow-grass

Triglochin palustre

Family: Arrow-grass (*Juncaginaceae*) - two genera in this family

What does it look like?

With leafless stems that stand 15-30 cm (6-12 in) tall, this marsh grass has club-shaped capsules at the tips of small stems that hold reproductive organs.

Can be confused with:

Two other arrow-grass species, both of which are OBL.

Where is it found?

Wet or boggy, alkaline areas.

Riparian/wetland Probability

Obligate Wetland plant: Almost always occur (estimated greater than 99% of the time) under natural conditions in a wetland.

Common Silverweed

Potentilla anserina

Family: Rose (*Roseacea*)

What does it look like?

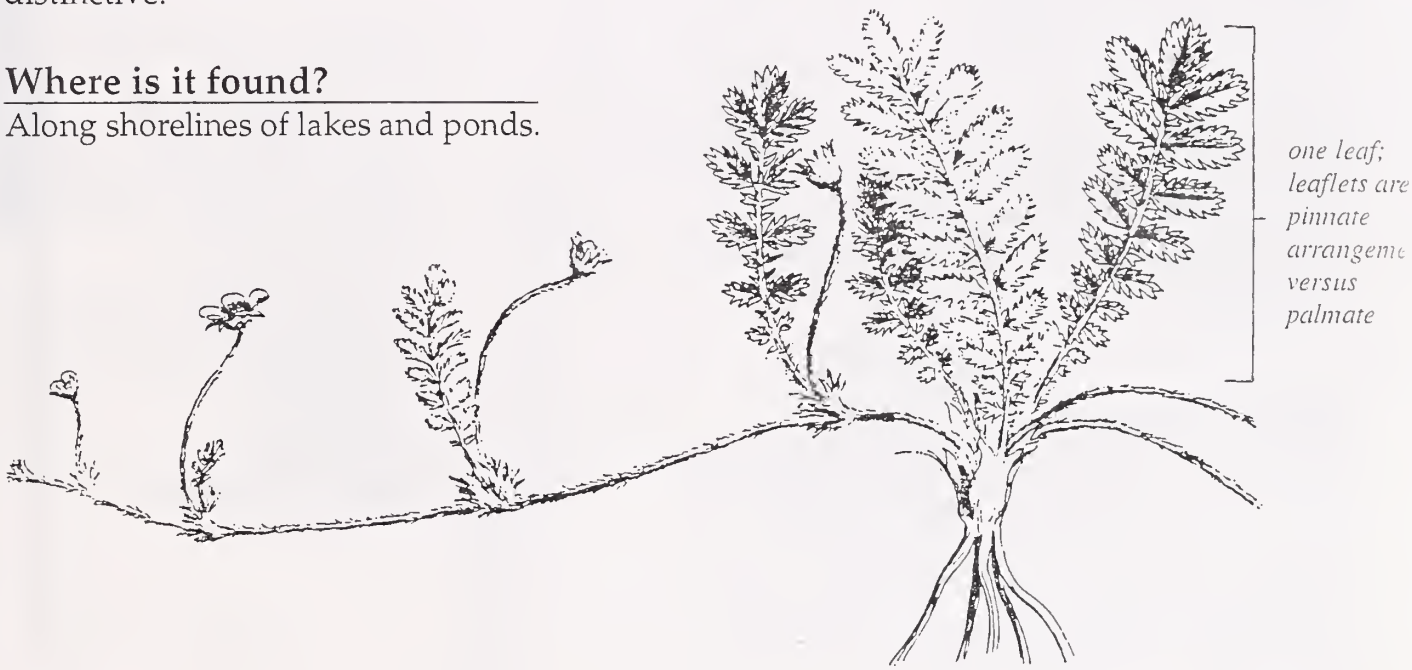
A low growing forb with leaves 8-15 cm (3-6 in) long. The leaves are divided into 7-25 coarsely toothed, lance-shaped leaflets that are usually green above and silvery white beneath. Has solitary yellow flowers with 5 petals.

Can be confused with:

Other *Potentilla* species with pinnate leaf arrangement - but the silvery underside is very distinctive.

Where is it found?

Along shorelines of lakes and ponds.



Riparian/wetland Probability

Obligate Wetland plant: Almost always occur (estimated greater than 99% of the time) under natural conditions in a wetland.

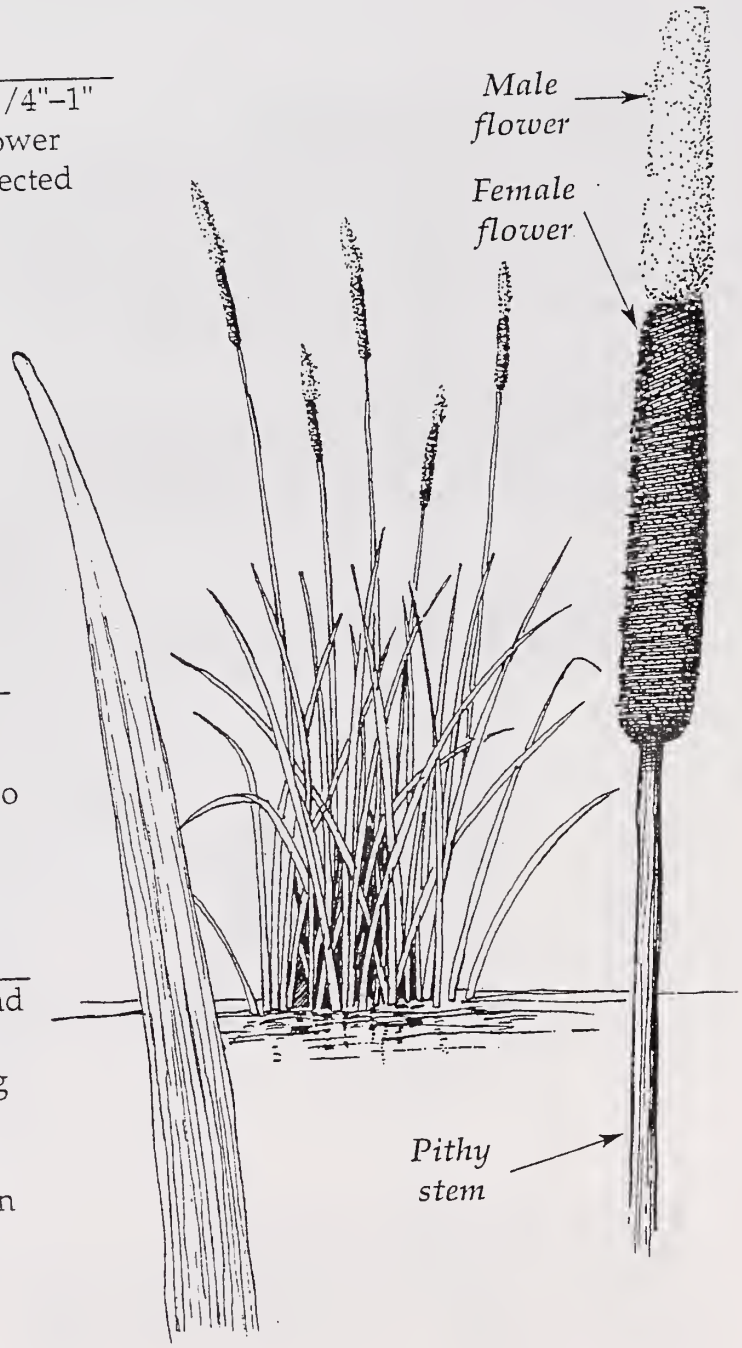
Cattail

Typha spp.

Family: Cattail (*Typhaceae*) - only genus in the family

What does it look like?

Three to nine feet tall, with pithy stem. Leaves 1/4"–1" wide, flat, with parallel veins. Velvety brown flower head with male flower (staminate) on top, connected to female (pistillate) on bottom. Perennial with large creeping rhizome.



Can be confused with:

Narrowleaf cattail is found only in eastern Montana, is shorter (3'–5'), flower on top separated in half by 1/2"–1 1/2" of bare stem, leaves less than 1/4" wide.

Where is it found?

Distributed statewide in marshes, ponds, backwaters of rivers and streams, in water up to three feet deep. Forms dense stands at low to mid elevations.

How is it used?

Provides erosion control by buffering wind and wave action on bodies of water. Building material for muskrat huts. Hiding and nesting cover for waterfowl. Hiding cover for deer. Little use by livestock unless abnormally dry conditions on surrounding uplands. Roots can be eaten in spring by humans.

Riparian/wetland probability:

Virtually Assured
OBL

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Broadleaf plantain

Plantago major

Family: Plantain (*Plantaginaceae*) - only one genus in the family

What does it look like?

Leaves with wavy margins, prominent veins, flat on ground extending outward. Flower head is a dense elongated spike. Averages about eight inches long. A fibrous rooted perennial.

Where is it found?

Previously disturbed moist areas at low to mid elevations.

How is it used?

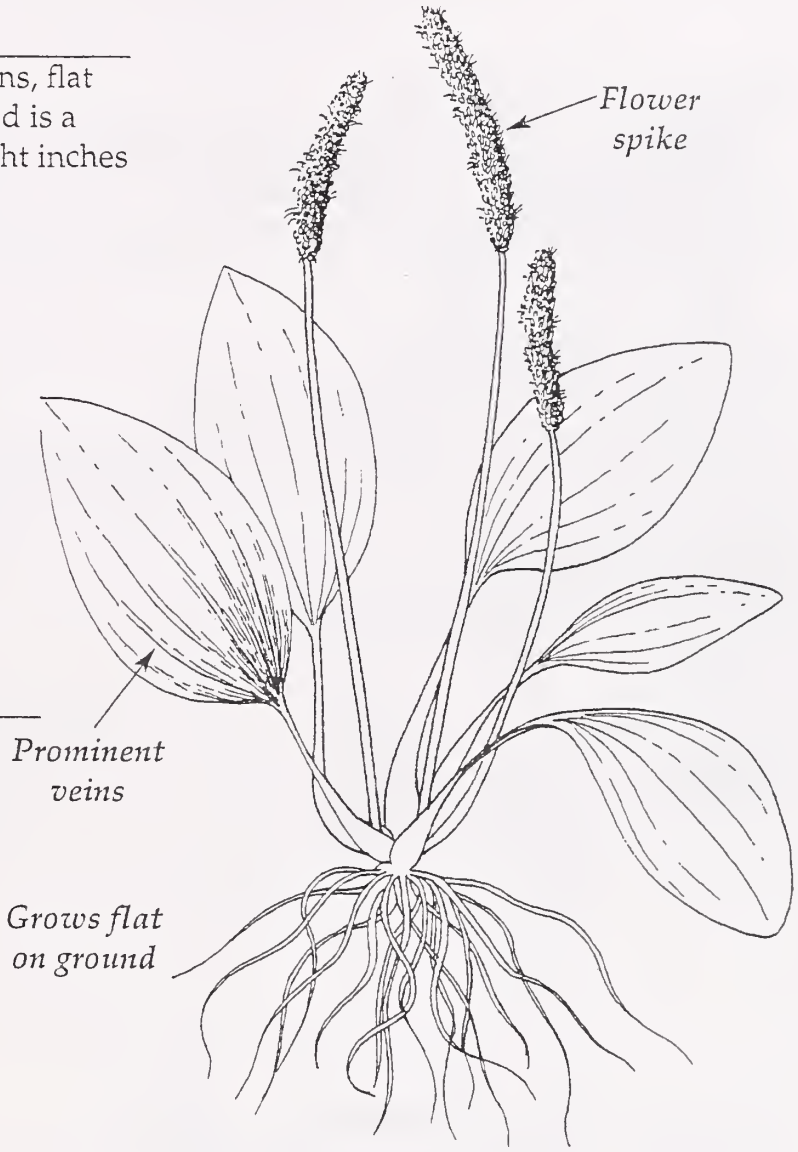
Considered a weed in most instances.

Riparian/wetland probability:

Low Probability

Can be confused with:

Water smartweed: see page 16.



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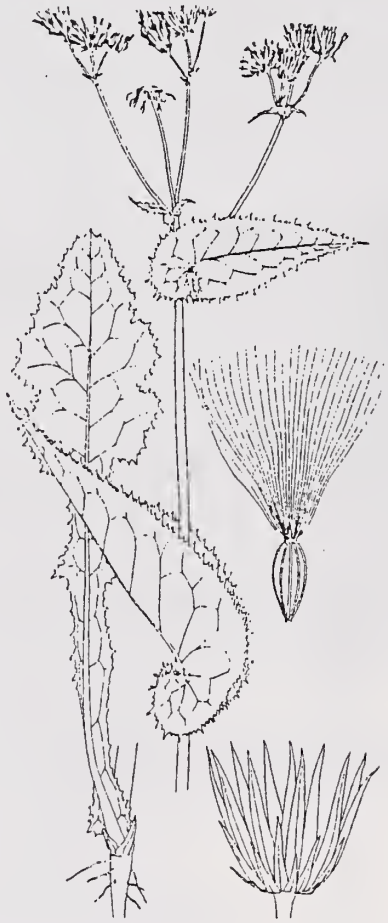
Prickly sowthistle

Sonchus asper

Family: Sunflower (*Asteraeae* - also known as *Compositae*)

What does it look like?

A weedy perennial with alternate, egg-shaped, toothed leaves. The solitary to numerous flower heads are composed entirely of yellow ray flowers.



Can be confused with:

The two other *sonchus* species, true thistles (genus - *Cirsium*), such as Canada thistle, as well as other species in the sunflower family.

Where is it found?

Wet fields, gardens and waste areas.

Riparian/wetland Probability

Facultative: Equally likely to be found in wetlands or nonwetlands (estimated these species can be found 34%-66% of the time in either a wetland or nonwetland).

Whitetop

Cardaria spp.

Also called Hoary cress
Family: Mustard (*Brassicaceae*, also known as *Cruciferae*)

What does it look like?

Leaves blue green, lance shaped. Lower leafs have stalks, upper leaves clasp the stem. Many white four petaled flowers give flat topped appearance. Fruits have inflated heart-like shape. A deep rooted perennial growing up to two feet tall.

Can be confused with:

Four species of hoary cress are found in the western United States. Differences in seed capsules and fruit are used to determine the correct species.

Where is it found?

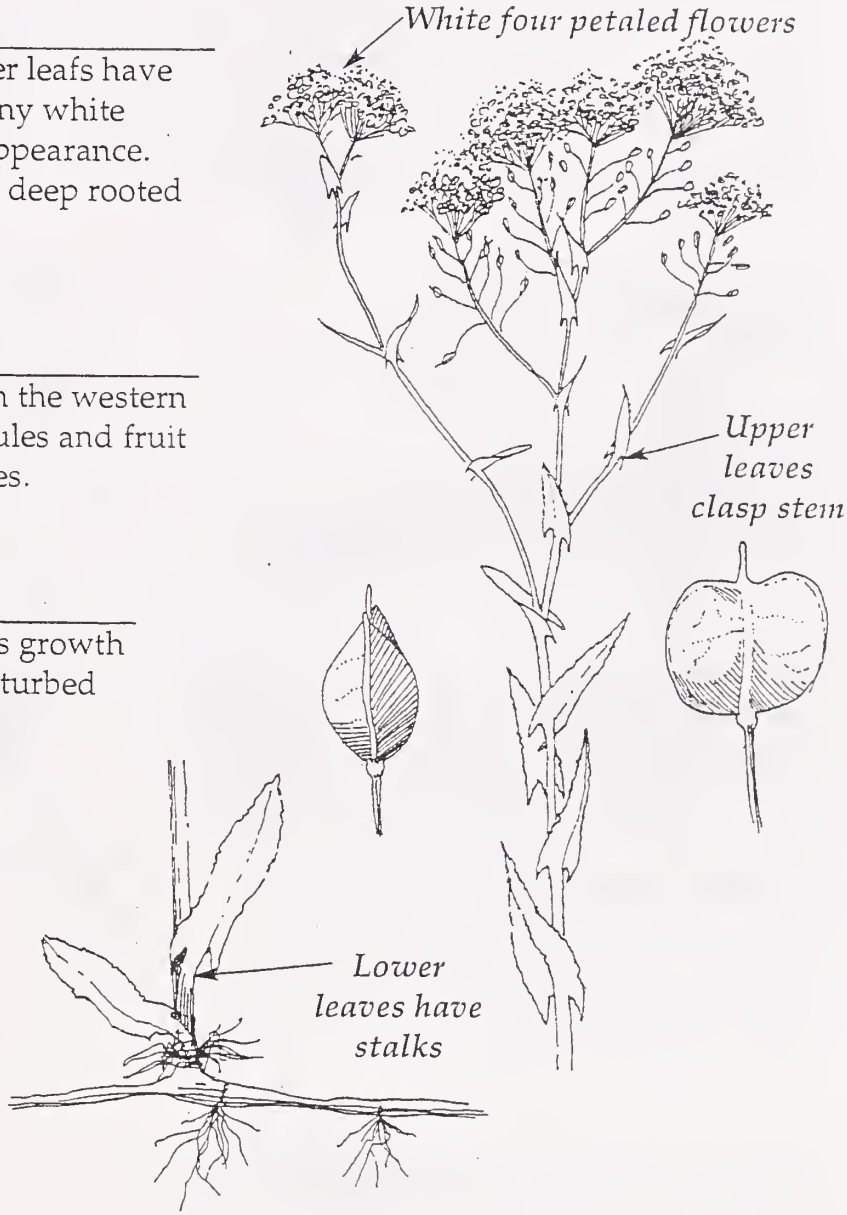
A highly competitive plant which starts growth in early spring and quickly invades disturbed sites. Will grow on alkaline soils.

How is it used?

Considered a noxious weed.

Riparian/wetland probability:

50/50 Chance
Not rated by the USFWS.



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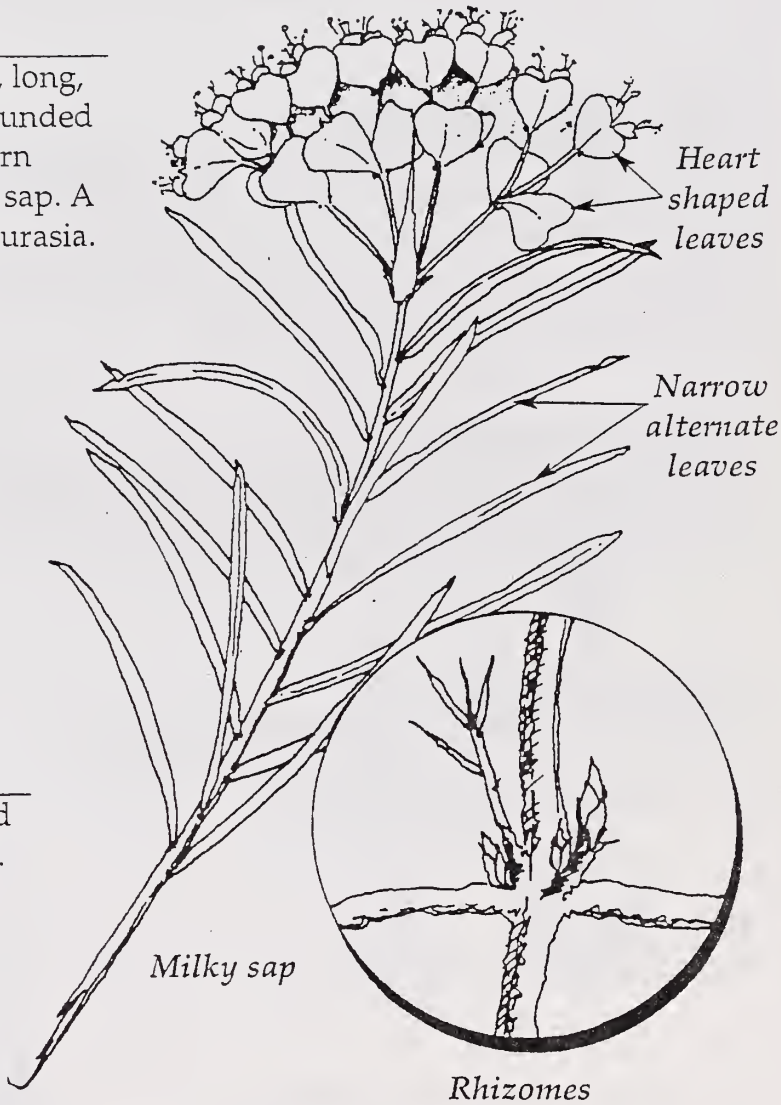
Leafy spurge

Euphorbia esula

Family: Spurge (*Euphorbiaceae*) - only 2 genera in family

What does it look like?

Stem branches near the top. Many alternate, long, narrow leaves. Inconspicuous flowers surrounded by large heart shaped floral leaves which turn yellowish-green near maturity. Has a milky sap. A perennial noxious weed. Introduced from Eurasia. Extensive, deep root system with rhizomes.



Can be confused with:

Nothing else.

Where is it found?

Roadsides, cultivated fields, pastures, and open forests. Invader on disturbed sites.

How is it used?

Undesirable forage for cattle, sheep, elk and deer. Sheep will eat it and can do well on it. Seeds may remain viable in soil for 8 years. Reported to cause severe irritation of mouth and digestive tract in cattle, may result in death. Mildly poisonous to people; its sap can cause skin irritation, inflammation, and blisters. Difficult to control with herbicides.

Riparian/wetland probability:

Low Probability

Not rated by the USFWS.

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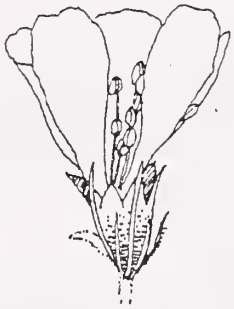
Purple loosestrife

Lythrum salicaria

Also called Purple lythrum
Family: Loosestrife (*Lythraceae*)

What does it look like?

Leaves lance shaped and attached at same level on stem. Flowers rose to purple colored, with 5-7 petals, on spike arrangement. Grows to eight feet tall. Introduced, long lived perennial with rhizomes.



Rose to purple flowers

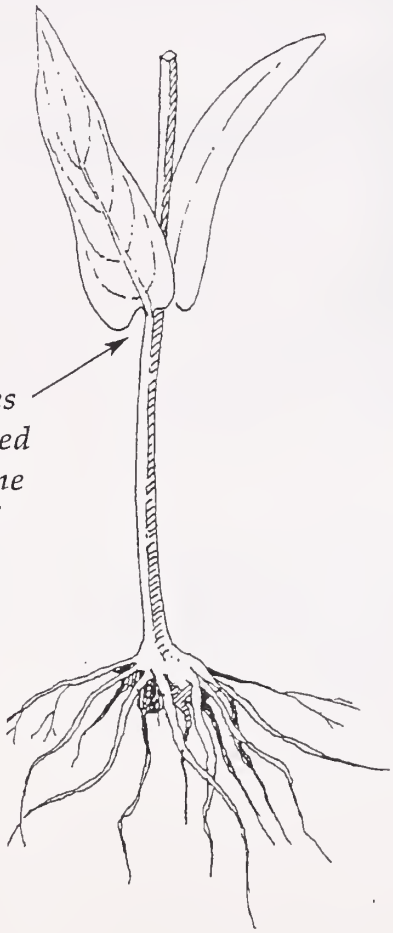
Grows to 8 feet tall

Where is it found?

Moist or marshy areas along streambanks, shallow ponds and shorelines.

How is it used?

Commercially sold as lawn or garden ornamental. Can dominate wetlands crowding out desirable food and nesting plants for waterfowl. Considered a noxious weed.



Leaves attached at same level

Riparian/wetland probability:

Virtually Assured
OBL

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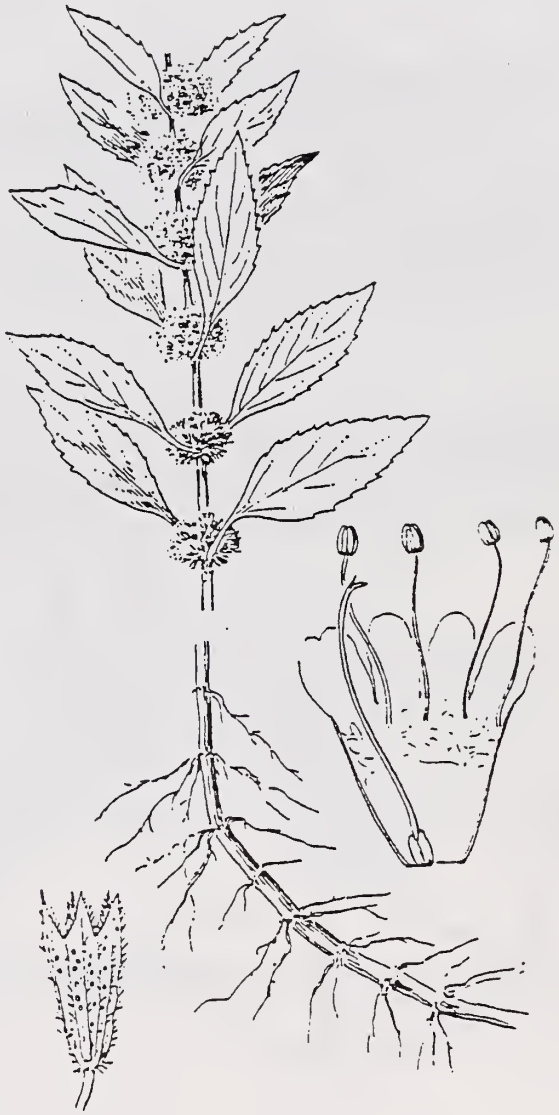
Wild mint

Mentha arvensis

Family: Mint (*Labiatae*)



What does it look like?

A perennial up to 50 cm (20 in) tall, with short spreading hairs. The highly aromatic minty leaves are serrated along the edges.

Can be confused with:

Other mint species; other genera in the mint family may have aromatic leaves, but not minty odor. Stinging nettle also resembles mint but is not aromatic - look closely before touching mint-like plants! See also Watson's Willow-herb (p. 27).

Where is it found?

Along rivers, sloughs, and irrigation ditches.

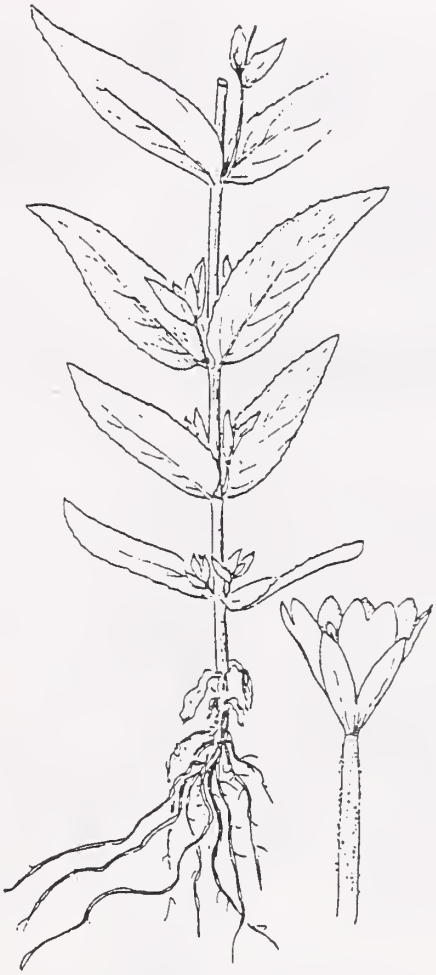
Riparian/wetland Probability

Facultative: Equally likely to be found in wetlands or nonwetlands (estimated these species can be found 34%-66% of the time in either a wetland or nonwetland).

Watson's willow-herb

Epilobium watsonii

Family: Evening Primrose (*Onagraceae*)



What does it look like?

Sometimes weedy, the stems are 30-100 cm (12-40 in) tall. They are hairy to hairless with finely toothed leaves opposite each other. Many times, the leaves grow in clusters.

Can be confused with:

Mint; but 2 flowers, rather than a cluster, occur at each leaf pair.

Where is it found?

Marshes, swamps, meadows, and floodplains.

Riparian/wetland Probability

Facultative Wetland plant: Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in nonwetlands.

Beggar's ticks

Bidens cernua

Family: Sunflower (*Asteraseae* also known as *Compositae)*

What does it look like?

5 - 100 cm (2 - 40 in) tall, with leaves that are narrowly to broadly lance-shaped, and usually toothed on the edges. The heads become nodding with age.

Where is it found?

Wet valleys, ponds and ditches.

Riparian/wetland Probability

Facultative Wetland plant: Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in nonwetlands.

Shrubby cinquefoil

Potentilla fruticosa

Family: Rose (*Roseaceae*)

What does it look like?

Low, widely branching shrub. Leaves divided into three to five leaflets and are white-silky beneath. Bright yellow flowers, 1/2"–1" across, with five petals. Young stems orange brown and hairy. Old stems gray with shredding bark. Buds hidden behind leaf base. Grows to four feet tall.

Where is it found?

Widespread throughout state in moist open areas at mid elevations.

How is it used?

Grazing value low for livestock and big game, fair for sheep. Well adapted for revegetating disturbed stream bank and moist meadow sites.

Riparian/wetland probability:

50/50 Chance

FAC - : (drier side of 34-66% occurrence.)

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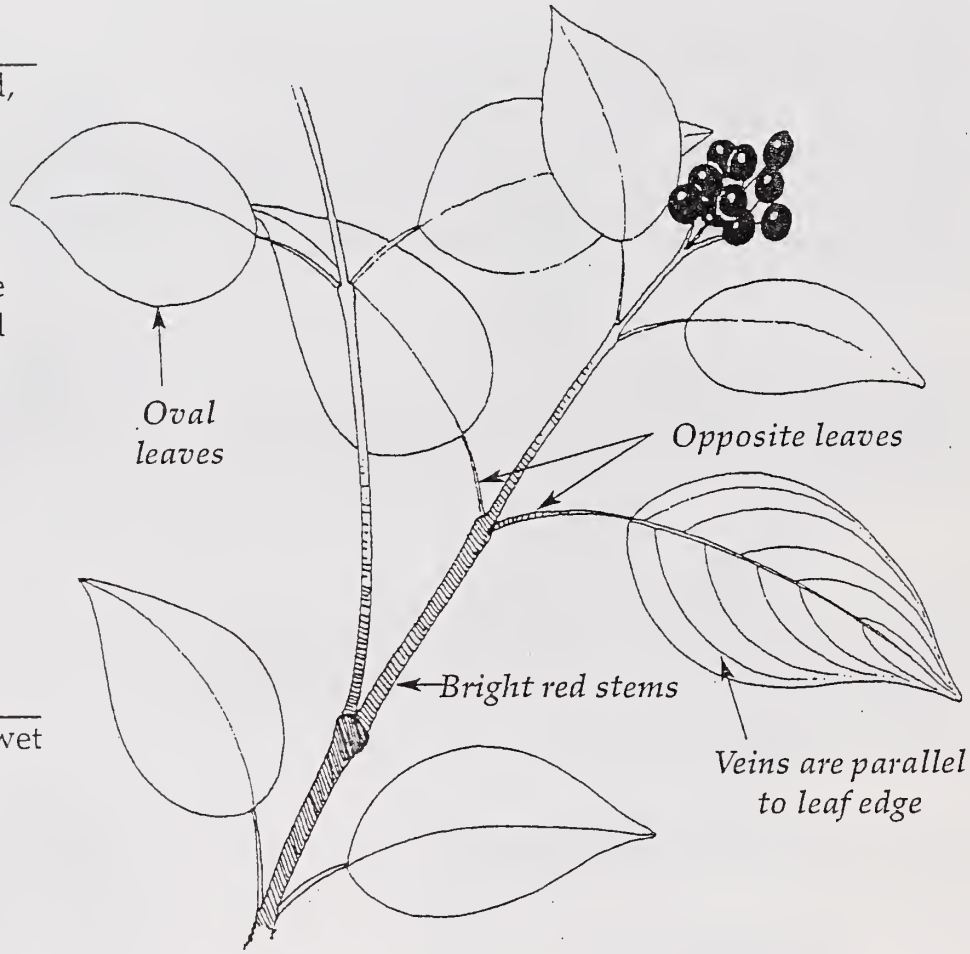
Red-osier dogwood

Cornus stolonifera

Family: Dogwood (*Cornaceae*) - only genus in family

What does it look like?

A native shrub. Stems dark red, very limber and strong. Branch tips often lodge in the ground and grow roots. Opposite leaves, pronounced veins, pointed at the tip. White flowers grouped in flat-topped clusters. Berries white or blue. Grows to 15 feet in height.



Can be confused with:

Nothing else.

Where is it found?

Along creek banks and other wet areas. Found across much of North America.

How is it used?

Preferred forage for elk, deer, and moose. Desirable forage for cattle and sheep. Undesirable forage for horses. Berries eaten by birds during winter. Planted to stabilize stream banks. Stem wood used by early Native Americans to make bows. Branches collected to make baskets.

Riparian/wetland probability:

High Probability

FACW

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Snowberry

Symphoricarpos albus

Family: Honeysuckle (*Caprifoliaceae*)

What does it look like?

A medium sized shrub up to 2 m (6 ft) tall. Egg-shaped leaves with some irregular serration. Pink to white flowers and white, berry-like fruit.

Can be confused with:

The two other species of snowberry that occur in our area.

Where is it found?

Valley, foothill, and lower montane zones.

Riparian/wetland Probability

Facultative Upland plant: Usually occur in nonwetlands 67%-99% of the time under natural conditions, but are occasionally found in wetlands.

Sandbar willow

Salix exigua

Family: Willow (*Salicaceae*) - includes only *Salix* and *Populus* genera

What does it look like?

Medium shrub glows to nine feet tall. Leaves long and slender, equally green on both sides, smooth margined or with scattered teeth. Male and female flowers on different plants (dioecious).

Can be confused with:

Over 30 species of willow are found in Montana. See Bebb willow (page 33),

Where is it found?

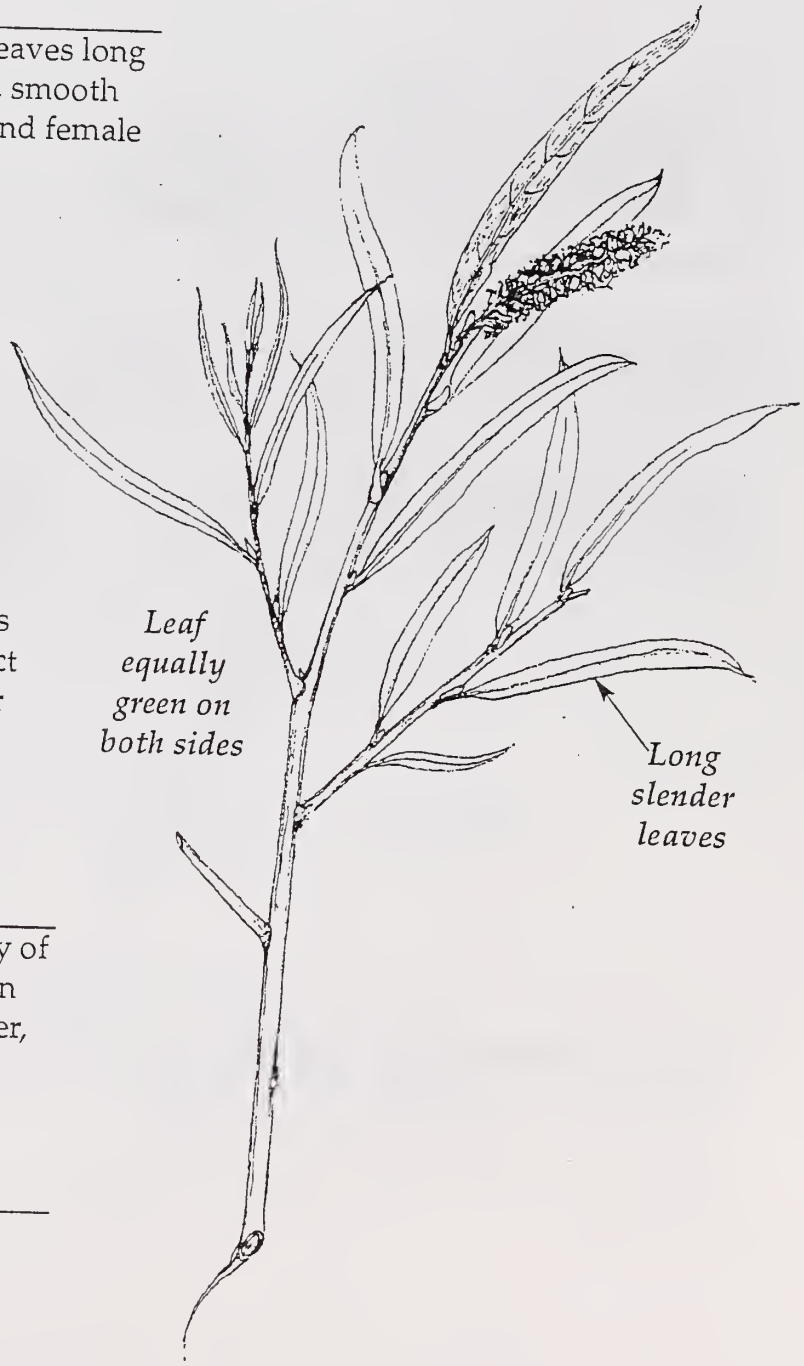
Narrow bands along streams, rivers, lakes and ponds. Often on islands. Areas subject to seasonal flooding and ice jams. Pioneer on recently disturbed areas at low to mid elevations.

How is it used?

Good thermal and hiding cover for variety of species. Useful in stream bank stabilization revegetation. Good browse for elk and deer, fair for cattle, sheep and horses.

Riparian/wetland probability:

Virtually Assured
OBL



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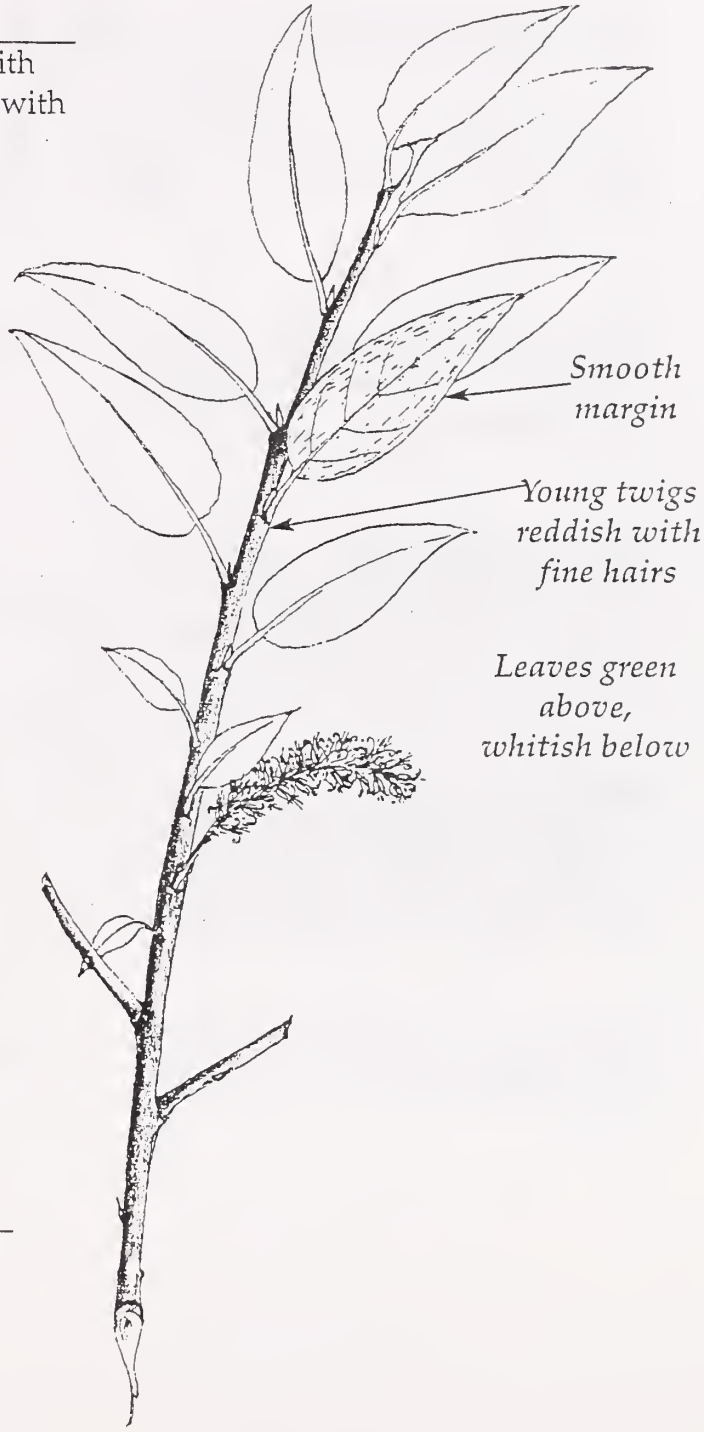
Bebb willow

Salix bebbiana

Family: Willow (*Salicaceae*)
includes only *Salix* and *Populus genera*

What does it look like?

Large shrub or small tree. Young twigs reddish with fine hairs. Leaves pointed at the top, green above with whitish cast (glaucous) below, and have smooth margins. Long beaked, hairy capsules (dry fruit) on long stipes (stalks). Male and female catkins on different plants (dioecious).



Can be confused with:

Over 30 species of willow are found in Montana. See Sandbar willow (page 32).

Where is it found?

Widely distributed. Common low to mid elevation in western and central Montana.

How is it used?

Valuable browse and cover for moose and elk, especially during periods of deep snow. Utilized by song and game birds for nesting and food. Sprouts following fire. Valuable for revegetating stream banks.

Riparian/wetland probability:

High Probability

FACW

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Water birch

Betula occidentalis

Family: Birch (*Betulaceae*)

What does it look like?

Tall tree-like shrub. Bark is smooth, shiny, reddish brown and does not exfoliate. Buds brown and pointed. Leaves alternate, serrate, 1"–2" long. Has winged fruit.

Can be confused with:

Paper birch. 2"–4" leaves, bark peels in thin papery strips.

Where is it found?

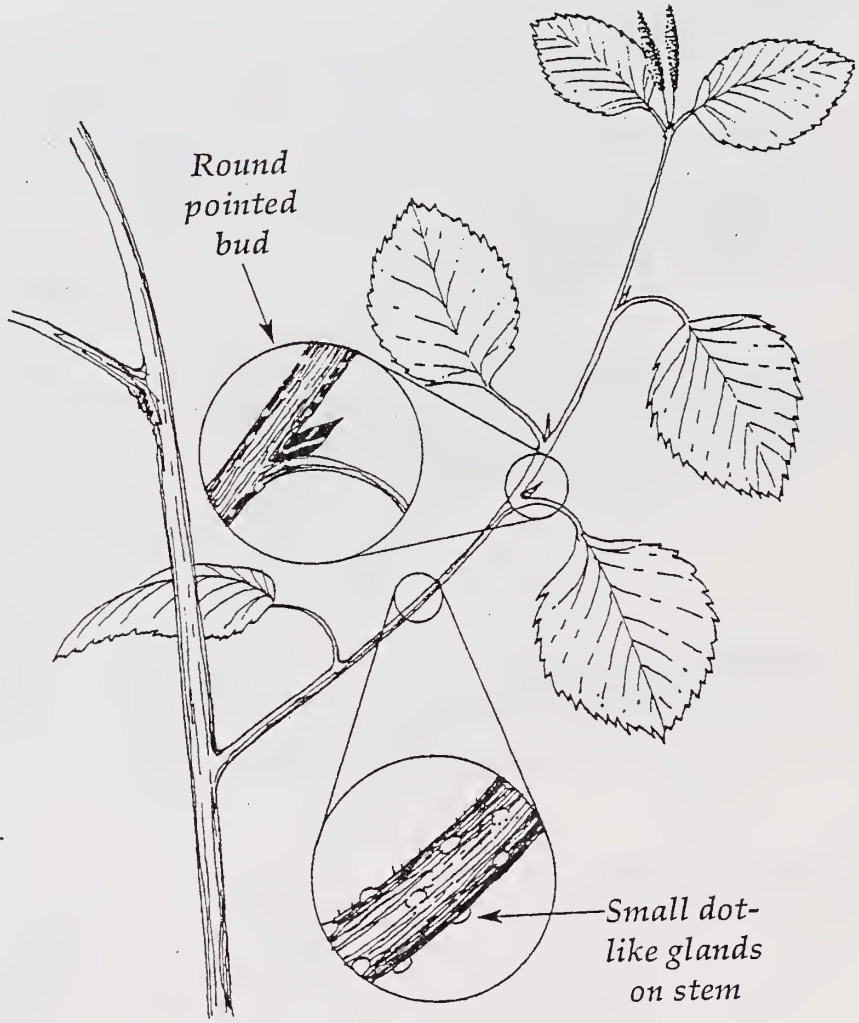
At low elevations along streams and rivers. Forms crowded dense thickets.

How is it used?

Little forage value. Hiding cover for a variety of birds and mammals. Good nesting habitat for songbirds.

Riparian/wetland probability:

High Probability
FACW



Reddish brown bark

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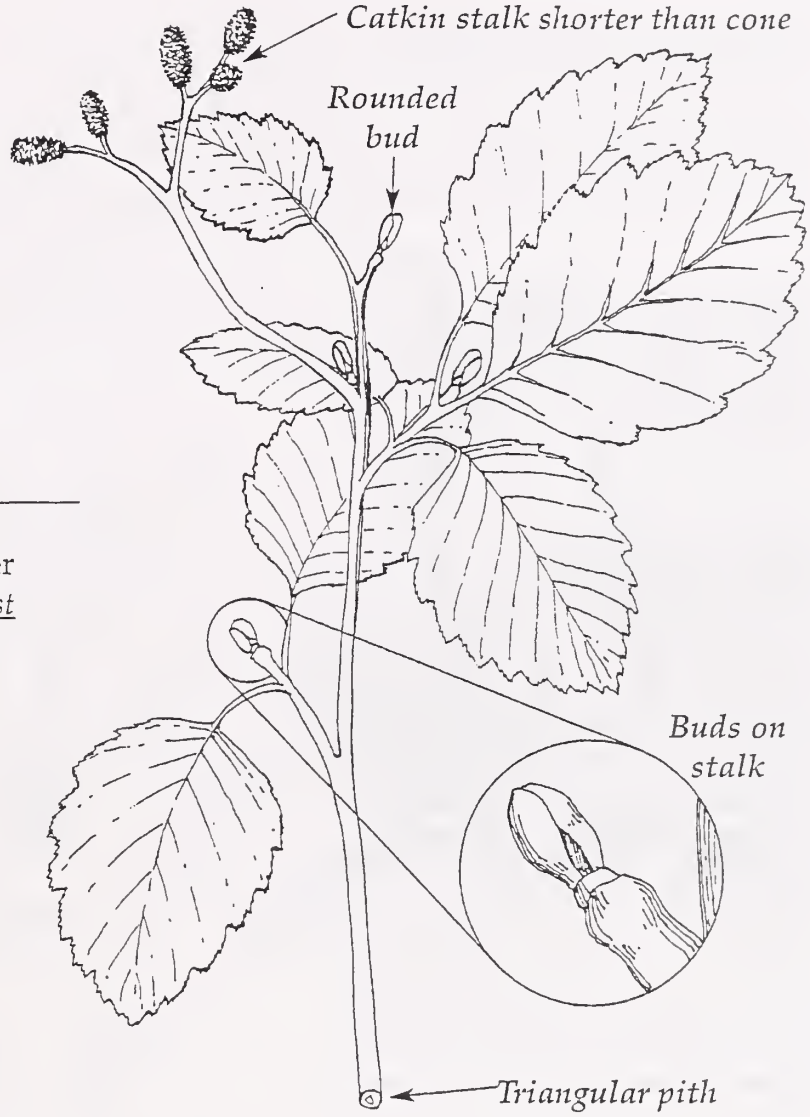
Mountain alder

Alnus incana

Family: Birch (*Betulaceae*)



What does it look like?

Tall shrub. Buds alternate with stalk, round or blunt point. Wingless seed. Young stems pubescent, persistent catkins with stalk shorter than cone. Pith triangular in cross section. Grayish brown to reddish bark. Leaves dull green on both sides with yellow green on central vein.

Can be confused with:

Sitka alder has smooth pointed buds and winged seeds. Stalk on catkin cones longer than cone. See *Important Plants Every Forest Steward Should Know* (page 18).

Where is it found?

Moist forested areas and along streams.

How is it used?

Nitrogen fixing bacteria on roots, and seasonally shed nitrogen rich leaves helping improve soil. Rarely browsed by livestock. Good hiding and thermal cover for deer and elk. Cutting in spring and fall results in rapid growth of sprouts, mid-summer cutting produces fewer slower growing sprouts.

Riparian/wetland probability:

High Probability
FACW

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Russian olive

Elaeagnus angustifolia

Family: Oleaster (*Elaeagnaceae*) - only 2 genera in this family

What does it look like?

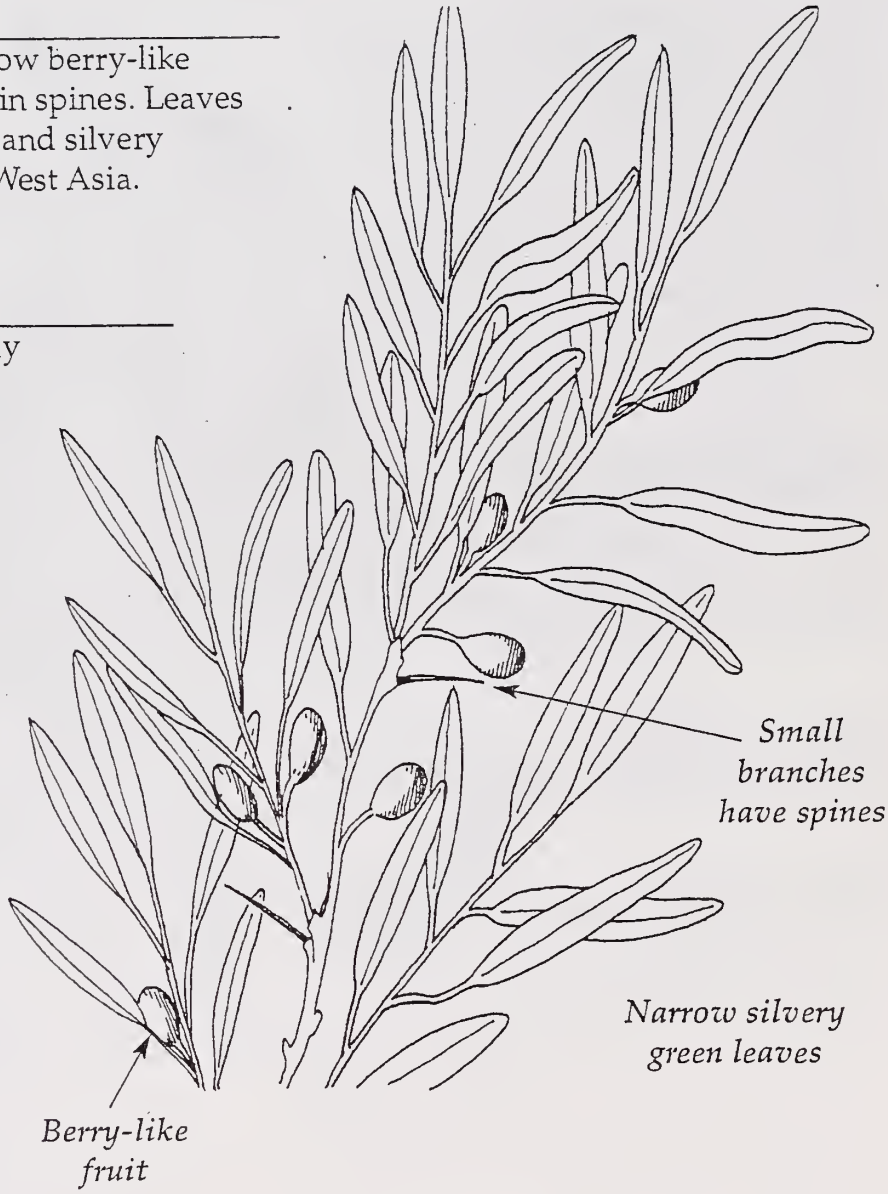
A small tree. Yellow flowers and yellow berry-like fruit. Small branches sometimes end in spines. Leaves narrow, alternate, smooth margined, and silvery green. Introduced from Europe and West Asia.

Where is it found?

Moist to dry soils, especially on sandy floodplains, primarily in eastern Montana.

How is it used?

Planted in shelter belts due to dense growth form, hardiness, and ability to adapt to a wide range of environmental conditions. Used for erosion control, wildlife-habitat plantings, and ornamental plantings. Has high potential to displace native riparian vegetation. Excellent cover for big game. Good thermal and hiding cover for many species of wildlife. Fruits eaten by pheasants, sharp-tailed grouse, squirrels, raccoons, white-tailed deer, and a variety of non-game birds. Poor forage for cattle, horses, and sheep.



Riparian/wetland probability:

FAC

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Narrowleaf Cottonwood

Populus angustifolia

Family: Willow (*Salicaecae*)

What does it look like?

Medium sized tree 50- 70 feet tall. Leaves are 2-6 in. long, smooth and yellow-green on top, smooth and pale on bottom. Texture is firm and thin. The bark is smooth, unbroken and pale green on young trees, and light grey-brown on older trees.

Where is it found?

Along streams and rivers, and around lakes.

staminate flower with bract

capsule

Riparian/wetland Probability

Facultative Wetland plant: Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in nonwetlands.

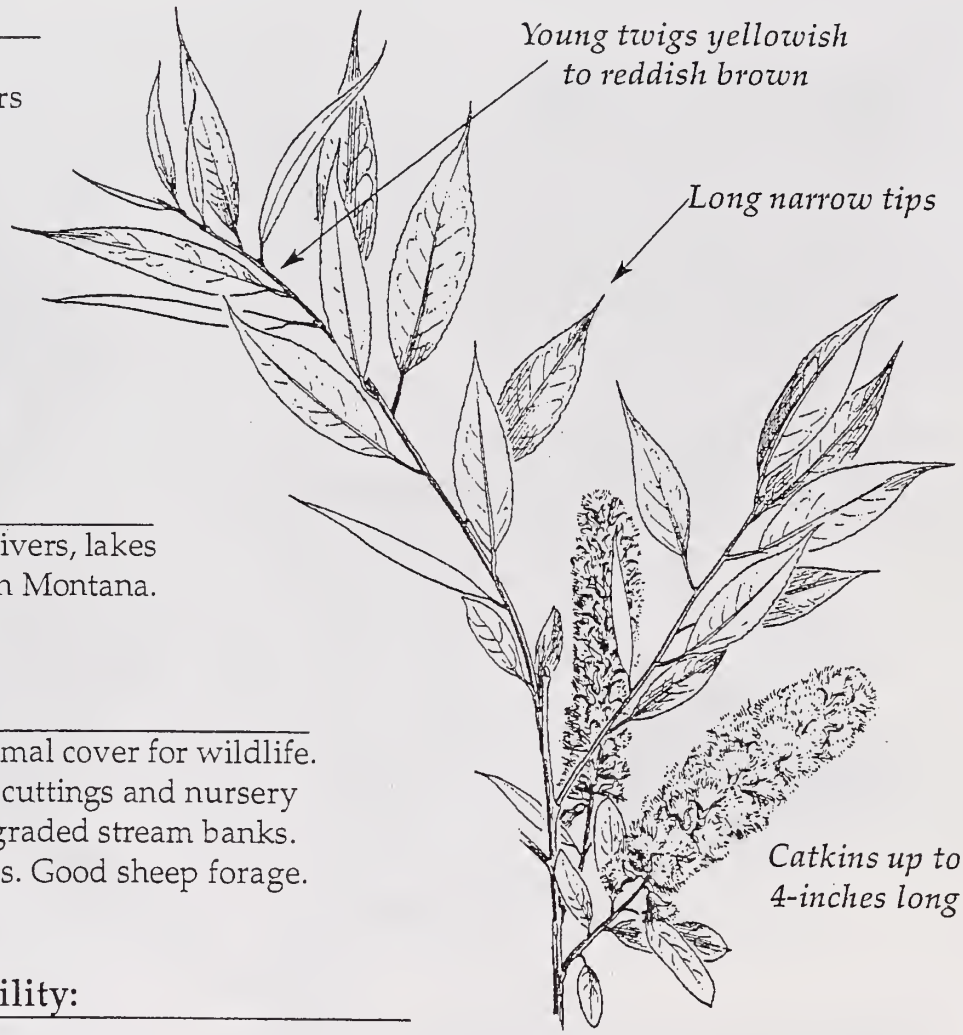
Peach-leaf willow

Salix amygdaloides

Family: Willow (*Salicaceae*) - includes only *Salix* and *Populus* genera

What does it look like?

Small tree usually with several trunks. Male and female flowers on different plants (dioecious). Catkins up to four inches long. Young twigs yellowish to reddish brown. Leaves green above, whitish below (glaucous), with long narrow tip, two to four inches long.



Where is it found?

Along low elevation streams, rivers, lakes and ponds, primarily in eastern Montana.

How is it used?

Provides good hiding and thermal cover for wildlife. Sprouts following fire. Rooted cuttings and nursery stock planted to revegetate degraded stream banks. Fair forage for cattle and horses. Good sheep forage.

Riparian/wetland probability:

High Probability

FACW

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Quaking Aspen

Populus tremuloides

Family: Willow (*Salicaceae*)

What does it look like?

Tree with greenish-white to light grey bark, usually with dark patches caused by injury. Open, rounded crown - rarely exceeds 15m (50ft) tall. Has fairly small broadly spade-shaped leaves 2-7 cm (1-3 in) long that are light green above and paler beneath, finely toothed with a pointed tip.

Where is it found?

Moist areas usually at low to mid-elevations.

Riparian/wetland Probability

Facultative: Equally likely to be found in wetlands or nonwetlands (estimated these species can be found 34%-66% of the time in either a wetland or nonwetland).

Plains Cottonwood

Populus deltoides

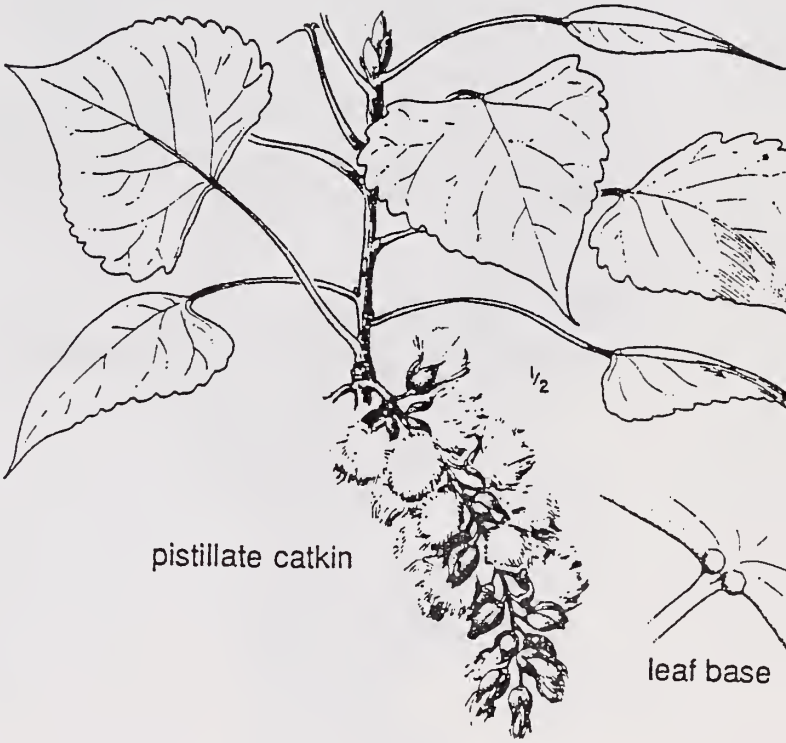
Family: Willow (*Salicaecae*)

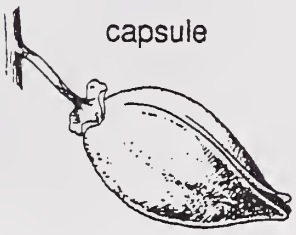
What does it look like?

A large tree up to 90 feet tall with trunk often 6 to 7 feet in diameter. Leaves are broadly triangular, 3-6 in. long with rounded teeth along the edges. Bark is grey and smooth on young trees; ash grey and furrowed on older trees.

Where is it found?

Along river corridors, valleys, and ditches.





Riparian/wetland Probability

Facultative Wetland plant: Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in nonwetlands.

Key to Hydrogeomorphic Wetland Classes and Regional Subclasses *

~~1.~~ Wetland is under the influence of tides 2
1 Wetland is not under the influence of tides 4

~~2.~~ Salinity greater than 30 ppt ..... Tidal Fringe (Euhaline)
~~2.~~ Salinity less than 30 ppt 3

~~3.~~ Salinity 5-30 ppt ..... Tidal Fringe (Mixohaline)
~~3.~~ Salinity less than 5 ppt ..... Riverine (Tidal)

4. Wetland is topographically flat and has precipitation as a dominant source of water ..... or 5
4. Wetland is not topographically flat and does not have precipitation as a dominant source of water 6

5. Wetland has a mineral soil ..... Mineral Soil Flats
5. Wetland has an organic soil ..... Organic Soil Flats

6. Wetland is associated with a stream channel, floodplain, or terrace 7
6. Wetland is associated with a topographic depression or on a topographic slope or flat 9

7. Stream is intermittent or ephemeral ..... Riverine (Nonperennial)
7. Stream is perennial 8

8. Stream is 1st or 2nd order ..... Riverine (Upper perennial)
8. Stream is 3rd order or higher ..... Riverine (Lower perennial)

9. Wetland located in a natural or artificial (dammed) topographic depression 10
9. Wetland located on a topographic slope or flat 13

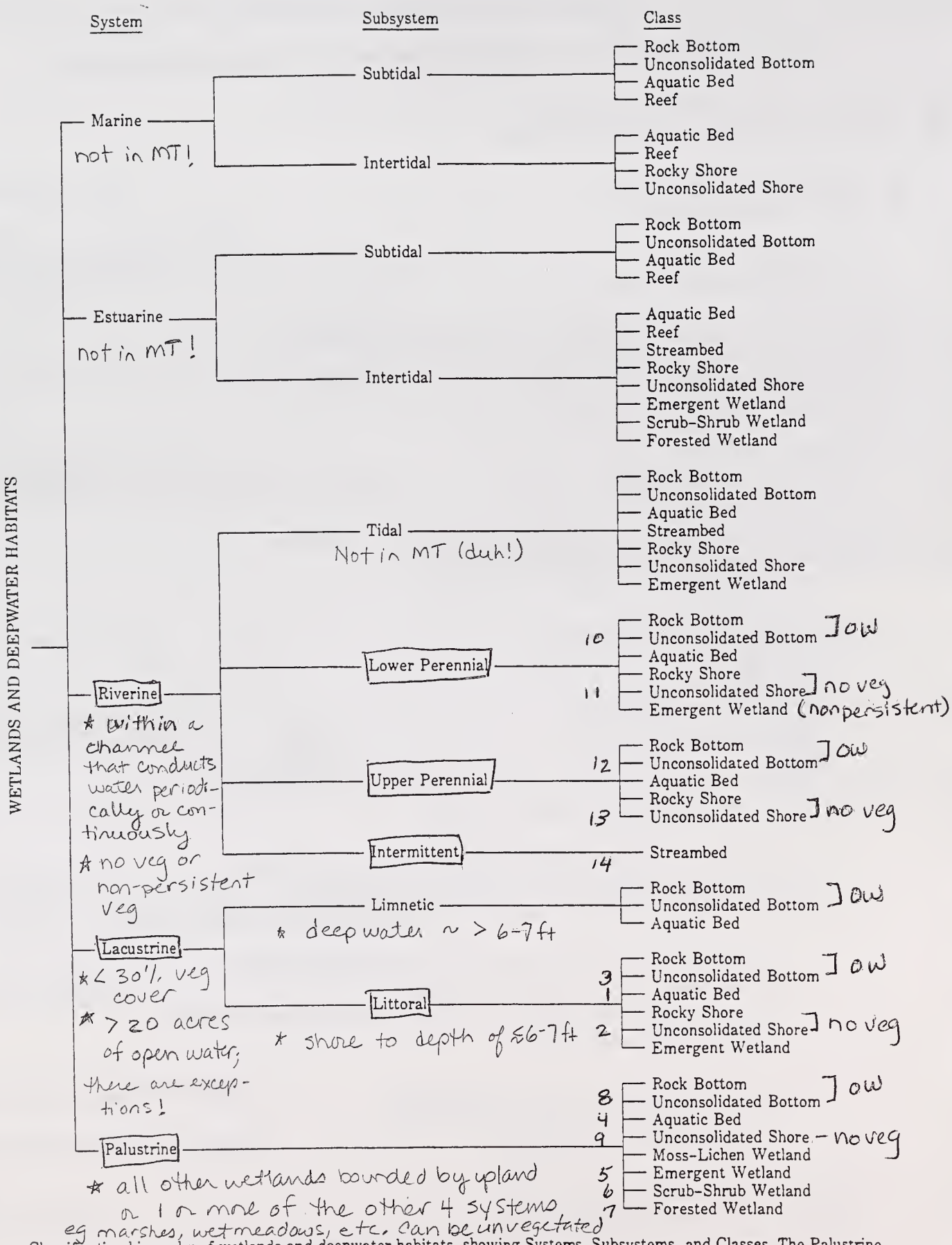
10. Topographic depression has permanent water >2 meters deep, and wetland is restricted to the margin of the depression ..... Lacustrine Fringe
10. Topographic depression does not contain permanent water >2 meters deep 11

11. Topgraphic depression closed without discernable surface water inlets, outlets, or other connections ..... Depression (Closed)
11. Topographic depression open with discernable surface water inlets, outlets, or other connections 12

12. Primary source of water is ground water ..... Depression (Open, Ground Water)
12. Primary source of water is precipitation, overland flow, or interflow ..... Depression (Open, Surface Water)

13. Primary source of water is ground water ..... Slope
13. Primary source of water is precipitation ..... Organic Soil Flats

* Hydrogeomorphic classes are followed by regional subclass in parenthesis



Classification hierarchy of wetlands and deepwater habitats, showing Systems, Subsystems, and Classes. The Palustrine System does not include deepwater habitats.

For Helena Area NWI lists Cowardin classes numbered 1-14.

FIELD NOTES

KLEER-FAX
RECYCLED
90000 SERIES
10% P.C.W.

HELENA COMMUNITY WETLANDS PARTNERSHIP
SLIDE SHOW TALK FOR LOCAL ORGANIZATIONS
OVERVIEW & SLIDE SHOW SCRIPT

35-40 minute slide presentation; 5 minutes for questions and answers. The slide set is available to borrow from Lewis & Clark County Water Quality Protection District (406) 447-1668.

FOCUS: "Wetlands 101"

What is a wetland
- water, plant, soil
- wetland types

Why are they important
- discuss functions such as wildlife habitat, food chain, flood attenuation, water purification, groundwater recharge, and others

Why do we want to protect them
- discuss threats to wetlands
- costs to society resulting from loss (flood impacts, water treatment...
- touch on losses (national, Montana)

We want to introduce the group to the Partnership and to generate interest in wetlands in our area. The focus is NOT specifically about our efforts, although a few slides mention our project; the idea is to get people interested in learning more and attending the May 22 seminar.

SOME POINTERS

- It is useful to contact the key person with the organization ahead of time
  - -clarify/confirm date and time of presentation;
  - -how many people attending
  - -get a sense of what the audience's interest/level of natural resources understanding is so you can tailor the talk some (call Pam or Charles for help if you need to)
  - -ask about the room set-up -maybe even go look at it- how dark can you make the room, (I'll get a flash light, extension cord, and pointer).
  - -tell them you will need a slide projector and screen but that you can also bring your own if they don't have one (in any case bring either Charles' or Susie's for backup!)
  - -ask how best to set up (on the spot or prior to meeting, etc.)

- Practice setting up the screen and slide projector so you get a sense of distance (for the screen we have, a distance of about 18 feet works well).

- Practice the presentation using the slides - all the stuff is in the Clubhouse; if you would like someone to listen or be there for questions when you practice just call Pam or Charles. Feel free to modify the prestentation.

- If Murphy's Law strikes and the slide show doesn't happen, improvise, punt, wing-it, and don't call Pam -- just kidding!! I'd suggest either postponing or trying to cobble the slide show narrative into a lecture on the spot.

THINGS TO BRING

- Both Slide Projectors
- Projector Screen
- Kit with flashlight, pointer, extension cord
- Flyers for May 22 Seminar - 10+ copies
- Partnership Fact sheet - 10+ copies
- Landowners Guide to Wetlands - 10+ copies
- Montana Wetlands Poster - 10+ copies
- Copy of the presentation outline and side show script
- Placard with Photo and Resource Materials Credits
- Large air photo with the NWI wetlands mapping

OUTLINE FOR PRESENTATION:

1) Introduction
   - speaker /brief description of the Partnership (**Pass out fact sheet**)
   - tell them what you are going to cover
     -what are wetlands, why are they important
     -to give them an understanding and appreciation for wetlands and hopefully generate interest in learning more about them

   summary of what we what them to come away with --
   eg "... wetlands are links between land and deep water habitats that support unique assemblages of plants and animals...."

2) Slide Show

3) Repeat what we want them to get from this talk
4) Announce upcoming Helena Workshop
5) **Ask if there are any questions.** [you may want to pause at several places in the presentation to ask for questions; but remember the timeframe you have and keep the discussion focused; offer to discuss more after the session or that you'd be happy to arrange a later time to talk]

We also developed a Short Version for a 20 minute presentation.

SLIDE SHOW SCRIPT

Introduce yourself

My name is _____ and I'm with the Helena Community Wetlands Partnership. [add more about yourself if you want to]

Describe the Partnership Briefly

Who: The Partnership is a collaboration among consulting biologists, local government people, and people with two non-profit organizations -- The organizations are:

- Lewis & Clark Water Quality Protection Dist.
- Lewis & Clark County Planning Dept.
- Montana Audubon and the Last Chance Chapter
- The Montana Wetlands Trust
- Pam Hackley, Consulting Soil Scientist

We have also sought advise and support from many others in the community including landowners, other agency people, and citizens. [pass out fact sheet]

The Project is funded by a federal Wetlands Protection Program Grant administered by the State of Montana.

What & Where: This 2-year project began in July 1998 and focuses on the Helena Valley from Helena to East Helena out to Lake Helena: [show on map - don't forget that most folks are not map users so orient them (north south, Helena, E. Helena, Interstate Lake Helena...]

The project goals include:

- compile existing resource information, maps, aerial photography...
- map wetlands using an ecological rather than a regulatory definition
- describe a few selected wetland areas in more detail -- such as functions, historical changes, wildlife use, etc.
- prepare maps for planners and public that show current and historical wetland picture
- develop an outreach program, with information materials, and small organization presentations, to raise awareness about wetlands in our community
- present the findings to the Helena community in a seminar
- take the project on a "road show" to 4 Montana communities to present what we did and how we went about it
- present findings to our local decision makers

A **key** part of the project was to use and train volunteers from Audubon to help map and describe wetlands as well as assist with historical research.

Finally, the project was intended to be a PILOT PROJECT to document how we did the work and what the pitfalls and successes have been.

Describe what you will be covering during the next 15-20 minutes.

I am here today as part of our outreach program. This talk is to give you an introduction to wetlands; to give you an understanding and appreciation for wetlands; and hopefully, to generate interest in learning more about them. I'll briefly cover

- What a wetland is
- Why are they important
- What is happening to wetlands
- Why do we want to protect wetlands in our area
- Where you can learn more about wetlands

Do the Slide Show and Wrap-up

SLIDE SHOW NARRATIVE

The slides and information sources used for this presentation were generously provided to the Partnership by a wide variety of people and organizations. I would like to acknowledge and thank all those who helped. All the contributors are shown on this small display board.

Slide 1 - Intro Slide

Wetlands are one of the most productive habitats on the planet. Many beautiful and interesting animals live in or near wetlands.

Slide 2 - Red-winged Blackbird

By living at the wetland's edge, this red-winged blackbird finds a nesting site, food, and protection from predators.

Slide 3 - Leopard Frog

Frogs are a common amphibian in wetlands. This leopard frog lays its eggs in the water; the tadpoles that develop have gills that take oxygen from the water. For the adult frog, the water and wetland provide insects for food as well as protection.

Slide 4 - Turtles

Turtles also require water and wetland habitats

Slide 5 - Muskrat House

In many wetlands, you will see mounds of mud and plants rising out of the water,

Slide 6 - Muskrat

This muskrat built the mound as its shelter. He also eats the new plants that grow in wetlands and uses the water to escape predators.

Slide 7 - Flock of Mallards

Ducks, such as these mallards, need wetlands for raising their young, for feeding, and for a place to rest during their long migrations in fall and spring.

Slide 8- Wetlands with standing water

Wetlands are places where water covers the ground or saturates the soils during some part of the year. Let's look at what a wetlands is.

Slide 9 - Small stream with cattail, willows, and upland

Wetlands are links between uplands [point to house in background] and deep water habitats, such as deep lakes, large rivers and the oceans. And they are unique assemblages of water, soil, and plants. Also, think of a how a sponge works when you think of a wetland.

Slide 10 - Wetland triangle

This diagram illustrates that water is the foundation of a wetland. The saturated conditions may be temporary or permanent but the key characteristic is that water replaces air to varying degrees in the soil. The soil develops special characteristics and the plants, insects, animals, and even bacteria, that live in these environments are adapted to waterlogged conditions during some part or all of their life-cycles.

Slide 11 - Thunderstorm in canyon land country

When water falls on the earth during rainstorms, several things can happen.

Slide 12 - River with High Flow

Some of the rain will run off in waterways. This river has received heavy storm runoff from the uplands. The water will eventually be carried to the ocean or inland lakes.

Slide 13 - Potholes with standing water

Some of the rain is stored in basins or potholes with no stream outlet. The water eventually soaks into the soil where it is used by plants or moves through to the deeper groundwater system (called an aquifer); or it evaporates back to the atmosphere to be stored for the next storm.

Slide 14 - Hydric Soil Profile

This side view of a soil found in a wetland exhibits many characteristics of long-term waterlogging. The red mottles in the gray matrix [point to area] is a typical feature. The red is like rust (iron exposed to air in the soil). The gray is "reduced" iron that is evidence of lack of air. This mottled area indicates that the water table (level of groundwater) fluctuates.

Slide 15 - Histic Horizon

This soil slice is from the top two feet of a wetland dominated by cattails with saturated conditions that are year-round. Notice how dark the slice is. It is

composed mostly of undecomposed plant parts that do not break down because there is not enough oxygen to fuel decomposition. We call this an organic-rich soil.

Slide 16 - Montana Wetlands Poster

These are some of the types of wetlands that we have in Montana.

- Riparian wetlands are associated with streams and play an important role in flood control.
- Marsh are wet almost year-long and usually have organic-rich soils
- Wet meadows may be wet only in the spring or into early summer and are typically dominated by sedges and grasses
- Potholes are small basins that hold water for varying lengths of time and are key part to migratory waterfowl habitat

Slide 17 - Plant ID workshop.

As part of our project, we trained volunteers in wetland plant identification. This instructor is describing a sedge commonly found in wet meadows or along streams with rich-organic soils. Other common wetland plants include.

Slide 18 - Elephant Head Flower

This elephant head flower blooms in the spring in wet meadows

Slide 19 - spikerush

This little spikerush grows around muddy lake and pond shores and also along slow-moving portions of streams

Slide 20 - American slough-grass

American slough-grass grows in slow moving water of streams, seeps and spring-fed areas of lakes. It is a high quality waterfowl food.

Slide 21 - Sandbar willow and cattail

Sandbar willow is the tall shrub on the left. Cattail is on the right. Both are common wetland plants.

Slide 22 - cattail marsh/wet meadow

This is a cattail marsh surrounded by a wet meadow [point]

Slide 23 - reed canary grass

This wet meadow has a concentric ring pattern. The outer ring is dominated by reed canary grass, [in the foreground], where wet conditions last for only part of the year. The inner ring is a sedge community that tolerates wet soils almost all of the growing season; finally there is permanent shallow pond in the center.

Slide 24 - Volunteers gathering data

Part of our project incouded ground-truthing in the field. Here we are collecting data in a wetland near Green Meadow Golf Course. It is a mosaic of wet meadow, marsh and riparian wetlands.

Slide 25 - Irrigation supported wetland

This is a small wetland complex built by diverting river water and controlling the inlet and outlet. The hard-stem bulrush in the foreground provides important food and cover for may wetland animals.

Slide 26 - Volunteers gathering data

Here are two of our volunteers collecting data in the large wetland complex on the west end of Lake Helena. They are looking for the boundary between "wetland" and "upland" by using vegetation as the indicator. And at the same time they are getting an exact ground location via Global Positioning System/Satellite technology.

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Slide 28 - Recap - Wetland Filled with water (Lake Helena and geese)

So, this is what wetlands do:

- they store water -- just like a sponge--, slowing runoff from reaching rivers to quickly and all at once, thereby, and attenuating floods;
- they permit water to soak into the ground water supply;
- they store water for long periods of time, allowing the water to evaporate into the air and provide moisture for future rains
- they have unique combinations of plants and soils that serve several purposes -- as water flows through them, (across the wetlands as well as down through the soil), wetlands filter out added sediment and transform harmful chemicals that may enter them.

Slide 29 - pintails

And as we have seen, wetlands provide home, food, and shelter for many animals. These pintail ducks require clean wetlands and lots of food. Notice the aquatic plants, buttercup and pondweed, floating at the surface.

Slide 30 - Shovelers

This is a female shoveler duck and her brood "getting their sealegs"

Slide 31 - Yellow-headed Blackbird

Here are other animals that depend on wetlands. the yellow-headed blackbird

Slide 32 - moose

Slide 33 - deer

Slide 34 - harlequin duck

Slide 35 - beaver

The beaver is well-known resident of wetlands; other mammals you will see include mink, otter, and raccoon.

Slide 36 - beaver pond

The beaver is famous for creating wetlands when water backs up behind the dams they build across streams. The dam is their shelter. Beaver ponds come and go and provide a long-term stable cycle on streams for sediment catchments and flood control.

Slide 37 - fox

This fox is hunting in a wetlands. Other predators you will see include coyotes, bobcats, hawks, and owls.

Slide 38 - heron

Many bird predators also make wetlands their home. The great blue heron is an important part of the food chain, eating amphibians and fish.

Slide 39 - Avocet

Migratory shorebirds are an important group of animals that are dependent on shallow, often seasonally-flooded wetlands. Avocets, and...

Slide 40 - sanderlings

...these sanderlings,... and other shorebirds, such as killdeer and sandpipers, depend on snails, insects and small fish that thrive at the water's edge.

Slide 41 - bald eagle

The bald eagle, which is a threatened species, is a predator often found near wetlands. They feed on ducks, fish and carrion.

Slide 42 - sandhill crane

This sandhill crane, flying over the Helena Valley, is a fall and spring visitor of great beauty and grace.

Slide 43 - snow geese

We often see these snow geese in Helena as they use our wetlands for resting and feeding during their long migratory flights between nesting in Alaska and Canada and wintering in the southern US

Slide 44 - Canada geese

Canada geese are a common sight in our area. Geese return to wetlands where they were hatched to raise their young. Some populations even become full-time residents.

Slide 45 - Trumpeter swans

We are also lucky to have these rare Trumpeter swans visit Helena Valley wetlands

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This next series of slides illustrates other important functions that wetlands provide and examples of how these functions can be diminished or lost.

Slide 47 - Pollution Dump

Human development of the land can often change or damage wetlands. Wetlands are indeed like sponges that filter, trap, store, and transform water and pollutants that enter them. Each wetland has limits as to what it can handle effectively. This polluted wastewater has overwhelmed a series of interconnected potholes in a coastal wetland system.

Slide 48 - Potholes

These next 3 slides show a series of pothole systems and the effects of alteration caused by human developments. This system is intact.

Slide 49 - Potholes - altered

This pothole system has been partially altered by roads that bisect wetlands which changes the water connections between potholes. Farming up to the edge or through potholes that dry out early enough in most years has aso occurred. However, many of wetland functions are still working effectively.

Slide 50 - Potholes - damaged

This pothole system has been severely altered by drainage. For a while, crops were grown here. The land is now severely affected by salt, does not provide temporary storage of storm waters, nor provide a link to the groundwater supply. The benefits provided by this wetland have been lost at the expense of short-lived agricultural production.

Slide 51 - Aerial Spray

Sometimes as part of our effort to control pests, like mosquitoes or crop pests, we do not use chemical sprays in an appropriate way. Ingested insecticides become increasingly concentrated as one animal feeds upon another, until, for example, a bald eagle or her offspring is poisoned.

Slide 52 - Overgrazed

When the grass around a wetland is grazed right up to the water's edge by livestock, temperature, nitrogen, and siltation increase and water levels decrease. There is not enough vegetation for birds to hide their nests. When the nests are no longer hidden, predators can easily find the nest and kill the nesting bird or eat the eggs.

Slide 53 - Grazed Wetland with Fence

An intact wetland, provides a buffer that supports the natural water-cleansing functions of wetland soils and plants, and provides habitat for widlife species. This wetland has been partially fenced to allow some areas to grow. Livestock can graze and get water while still providing habitat for nesting birds.

Slide 54 - Overly- developed river floodplain

This is an example of a highly altered river floodplain system, The floodplain has been drained and filled for intensive urban development.....

Slide 55 - Flooded Town

.....as a result, when it rains, floods will occur; and when the floodplain has been leveled, confined, and paved-over flooding can be disastrous. Flood control is one of the most important benefits we get from wetlands. When there are no wetlands to catch rainwater and retard run-off, flooding is more frequent and of larger proportions.

Slide 56 - Flood damage

When flood-waters recede, damage to developed lands is severe and devastating. Tons of productive soil are lost -- as is the investment in the land.

Slide 57 - Erosion/basin

Even small wetlands play a part in slowing erosion. When native wetland plant cover is removed or converted to uniform stands of shallow-rooted crops, erosion rates increase.

Slide 58 - Intact

An intact wetland provides a buffer that better allows for the natural cleansing of water by wetlands soil, plants and animals.

Slide 59 - Oil spill

This wetland has been polluted by oil. The amount of oil is too great for the plants and soil to properly clean water - as they normally would.

Slide 60 - Suds

This soapy water, rich in phosphates, can cause rapid plant growth. When plants die, their decomposition causes oxygen levels to drop. This may lead to large numbers of fish dying at one time.

Slide 61 - Students

Despite the damage that wetlands can sustain, wetlands offer us many other pleasures and benefits. Wetlands provide an outdoor classroom for students.....

Slide 62 - Sampling for aquatic insects in wetland

.....and scientists. Through these studies, we learn more about the plants, wildlife, and the earth on which we live.

Slide 63 - birdwatchers

Recreation in wetlands provide enjoyment for many of us. Photography and watching the many birds and animals found in wetlands provide hours of pleasure and relaxation. Also, wildlife-watching has become a billion-dollar industry for the US.

Slide 64 - hunters

This hunter is enjoying a day of duck hunting with his dog and friends. Some of the money hunters spend for licenses and duck stamps goes to habitat purchase.

Slide 65 - anglers

These young anglers are hoping for a strike soon. Wetlands provide clean water and places for both freshwater and saltwater fish to breed. These activities all bring substantial income to Montana.

Slide 66 - Wetland/Waterfowl near an Industrial Plant

The US Fish and Wildlife Service estimates that we have lost 79% of our FRESHWATER wetland base -- in the US (including Alaska and Hawaii).

Human development can be compatible with wetlands - wetlands are no longer a nuisance area to "fix or get rid of". This industrial complex is near a very productive waterfowl area. There are may opportunities to protect wetlands if we think creatively.

Slide 67 - We will never have as many wetlands as there were years ago, but we can try to take care of the wetlands we have and strive to restore or replace some that have been lost.

WRAP-UP *Turn projector to fan setting and turn on the lights.*

Concluding Remarks;

What I'd like for you to take from this "introduction to wetlands", is a sense of their importance to society and our community; that wetlands come in many shapes, sizes and forms and that they are vital places on the landscape; and that their conservation saves us precious tax dollars.

Here are the most important functions that wetlands in the Helena area provide for us.

- Wetlands purify water and then return clean water to our drinking water sources, both groundwater and surface water,

- Wetlands control high stream flows and runoff that can cause major flooding because they store water like a sponge,
- Wetlands and riparian areas are natural stormwater systems.
- Wetlands provide food and shelter for a wide variety of animals, birds and other critters that live here year-round or migrate through during spring & fall
- Wetlands provide open space for our enjoyment, recreation, education -- thereby enriching our community and economy.

Hand outs:

For those interested in more information, offer a copy of the **Montana Wetlands Poster** or this booklet, **A Landowners' Guide to Montana's Wetlands**.

Announce May 22 Workshop in Helena

For those of you who may be interested in learning more about our project we are hosting a seminar:

Time: Monday, May 22, 5-9PM
Location: Carroll College
Food: Dinner provided
Focus:

- what we have found out about wetlands resources in the Helena area
- tools you can use to identify wetlands and inform others
- forum for discussion
- presentation by others working on related projects

Ask if there are any questions. [you may want to pause at several places in the presentation to ask for questions; but remember the timeframe you have and keep the discussion focused; offer to discuss more after the session or that you'd be happy to arrange a later time to talk]

Say "THANK YOU" for the_____ [organization] for inviting me to speak today.

HELENA WETLANDS COMMUNITY PARTNERSHIP
SLIDE SHOW CREDITS
FOR PHOTOS AND RESOURCE MATERIALS

PHOTOS

- Rob Hazlewood
- Susan Lenard
- Ed Tyanich
- Tony Rolfes
- Charles van Hook
- Pam Hackley
- Ed Surburgg/Tetra Tech EMI
- US Fish and Wildlife Service
- Montana Dept. of Environmental Quality
- Montana Watercourse

RESOURCE MATERIALS

- Montana Watercourse
  - A Landowners' Guide to Montana Wetlands
  - W.O.W. -- The Wonders of Wetlands
  - Montana Wetlands Poster
- US Fish and Wildlife Service
  - Wetlands and Wildlife - A Guide for School Presentations
  - Shorebirds and Agriculture
  - Ensuring Quality Habitat for Fish and Wildlife
  - Classification of Wetlands and Deep Water Habitats
- Natural Resources and Conservation Service
- Reichel & Flath, 1995, Identification of Montana's Amphibians & Reptiles
- National and Montana Audubon Society
- The National Wildlife Federation
  - A Citizen's Guide to Protecting Wetlands, 1989

Supplement to Final Report
Wetlands Community Partnership
Grant Period - July 1, 1998-June 30, 2000

Task J: Community Outreach/Education: In lieu of a fifth presentation to a Montana community, the Partnership participated in the following education and outreach activities:

- Slide presentation for community service groups: The Partners prepared a 20 minute slide presentation entitled "Wetlands 101." The presentation covered "what is a wetland," "why wetlands are important," and "why we want to protect them." Ten presentations were made between March 7 and May 18, 2000. A second objective of the presentations was to encourage people to attend the more in-depth presentation about the Helena Valley wetlands project which was scheduled for May 22. The slide presentation was made to the following local groups:

Architectural Society of Helena, May 9, 2000, CWG Architects, 650 Power St., Helena
Engineers Society, May 11, 2000, Helena
Helena Surveyors Club, March 7, 2000,
Helena Home Town Pride, April 27, Ray Bjork School, Helena
Helena Civitans, April 18, 2000, Jorgenson's Restaurant, Helena
Helena Rotary, May 10, 2000, Montana Club, Helena
Last Chance Kiwanis, April 17, 2000, Jorgenson's Restaurant, Helena
Lewis and Clark County Library Brown Bag Lunch, April 20, 2000, Helena
Lewis and Clark County Weed Board, April 5, 2000, City-County Building, Helena
Sunrise Rotary, May 18, 2000, Park Plaza Hotel, Helena

A total of approximately 125 people attended these presentations.

- Additionally, Wetlands Partners made presentations about the Helena project to the Montana Sanitarians Conference (April 25, 2000, Cogswell Building, Helena, MT) and at the Big Sky or Big Sprawl Conference (January 21, 2000, Carroll College, Helena, MT). Partners also made a presentation at a GIS Conference (Kalispell, May 4, 2000).

A total of approximately 125 people attended these presentations. Each of these three conferences represented a state-wide audience.

- The Wetlands Partners plan to make a presentation highlighting the Helena project at the Montana Planners Association annual meeting in the spring of 2001. This will also be a state-wide audience.

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National Wetlands Inventory Verification

Rj Zimmer, LS

The U.S. Fish and Wildlife Service is responsible for the inventorying and mapping of our nation's wetlands. The product of its efforts is the National Wetlands Inventory (NWI). The following excerpts are taken from the Overview published on their Web site at *www.nwi.fws.gov/overview.htm*.

"The National Wetlands Inventory (NWI) . . . produces information on the characteristics, extent, and status of the Nation's wetlands and deepwater habitats . . . About 33% of the lower 48 states and 11% of Alaska are digitized . . . Users of NWI maps and digital data are as varied as the uses. Maps are used by all levels of government, academia, Congress, private consultants, land developers, and conservation organizations. The public makes extensive use of NWI maps in a myriad of applications including planning for watershed and drinking water supply protection; siting of transportation corridors; construction of solid waste facilities; and siting of schools and other municipal buildings . . . [The maps] are essential . . . for fisheries restoration; floodplain planning; and endangered species recovery plans. . . . Regulatory agencies use the maps to help in advanced wetland identification procedures, and to determine wetland values and mitigation requirements.

Good planning protects the habitat value of wetlands for wildlife, preserves water quality, provides flood protection, and enhances ground water recharge, among many other wetland values . . ."

Project Origins

We can see that the impact of the NWI is far reaching—affecting many farm, wildlife, and development activities, which leads to the question, "How reliable is the NWI?" That is, has the NWI effort adequately and accurately identified and mapped wetlands? Additionally, what are the impacts for folks at the local level: developers, wildlife enthusiasts, sportsmen, farmers, city, county, and state officials, etc.?

The NWI was developed by aerial photo-interpretation from various scale photography. It was not intended to be a complete or large-scale inventory but rather a consistent one for small-scale identification. One would therefore expect that an on-the-ground verification

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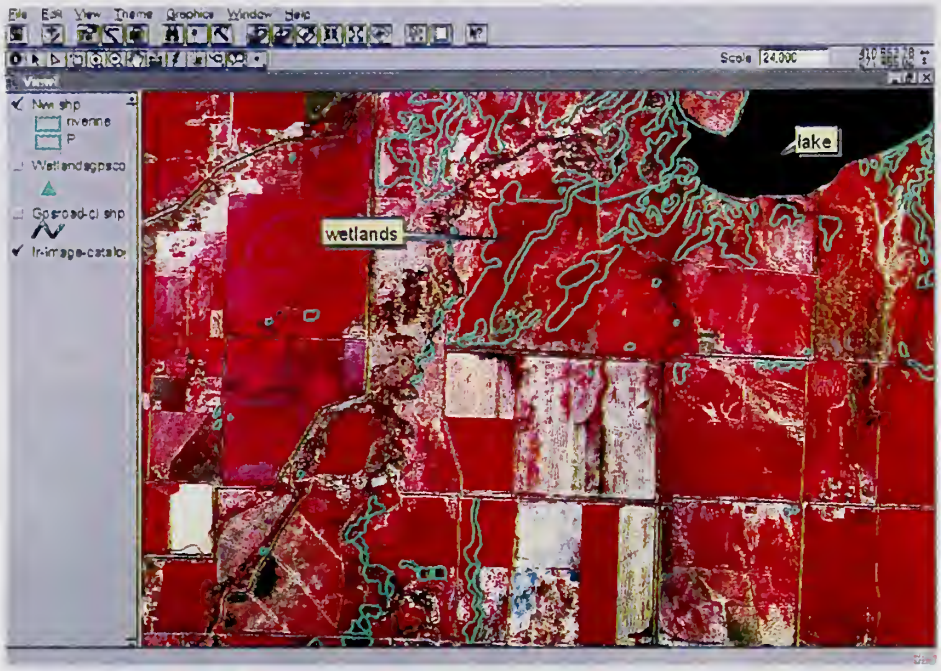

Figure 1: National Wetlands Inventory

process would obtain somewhat different results.

To answer these questions for the Helena Valley area of Montana, a community partnership was formed between the Lewis & Clark County Water Quality Protection District, Lewis & Clark County Planning Department, private soils and wetlands scientists, the Montana Audubon Society, and the Montana Wetlands Trust. This partnership of interests applied for and received a $60,000 grant to "perform a baseline wetlands inventory, including historical documentation of the Helena area using existing data, volunteers, and professional wetlands scientists for the purpose of raising awareness in the community regarding voluntary wetland protection, conservation, and restoration." This project was not intended to necessarily expand the extents of wetlands nor increase regulatory or other constraints. Rather, the goal was to verify and inform.

The project was divided into specific tasks, as described below.

Information Gathering Compiling soils, vegetation, and ground water information, as well as the recently mapped NWI. Infrared photography would be obtained from a new flight as well as older black and white photography.

Base Wetland Map Development Overlaying existing map data to check for correlation of the variety of data, from which a comprehensive base wetlands map can be created.

Historical Map Development Same as above except that the focus was historical (any relevant data prior to the NWI mapping in 1984 and 1987).

Ground-truthing the NWI Verification of the locations, extents and characterizations of the NWI wetlands.

Community Outreach "Road shows," brochures, talks, and seminars about the project's scope, methods and findings were presented to communities in the Helena Valley and in other communities throughout Montana.

Methods

The initial approach to the project was a traditional hand drafted, hard copy approach to collecting and integrating the data and maps. However, early on in the project the county Geographic Information Services department became part of the team. The introduction of GIS applications shifted the efforts of the work needed to perform the tasks away from the hand drafting and interpretation to analysis and verification of the NWI.

GIS/GPS Methods Used

Downloading Quadrangles The first step in collecting the data for this project was to download the four quadrangles of the Helena Valley NWI (see: *www.nwi.fws.gov/download.htm*). The file format was in ArcInfo export file format (E00), as a polygon coverage. These data were in Universal Transverse Mercator (UTM), North American Datum of 1927 (NAD 27), (both in meters) which were converted to State Plane Coordinates, NAD83 meters, to match the other county data sets (see **Figure 1** NWI). The NWI data thus obtained had attribute coding for a hierarchical wetlands type, with subsubsystems for hydrological conditions and subclasses for vegetation classes. Thus the NWI GIS data could be represented in a variety of ways. Most map products for this project did not require the classification of the data beyond whether or not an area was identified as a wetland.

Obtaining Infrared Aerial Photography This task was performed by Missoula Aerial Photographers Inc. of Missoula, Montana, which flew the Helena Valley for this project in September of 1998. They provided 9" x 9" color infrared photos at 1:12,000 scale with 45% overlap. Because this project lacked funds for digitizing and rectifying the photography volunteers performed those tasks as described below.

Scanning and Digitizing the Photos A GIS volunteer scanned each photo on an HP IIe Color Scanner at 150 dots per inch (DPI) into a Tagged Image File Format (TIFF). The resultant file sizes were approximately 1-2 megabytes each.

Rectifying the Images This was a multipart task that required some GIS technical skills as well as volunteers for field work. The county's GIS had an existing GPS road centerline GIS layer with a 1-5 meter accuracy which was used for photo control on those images with sufficient roadways. The use of road intersections provided partial or total control for most of the maps. Some maps had no roadways and some maps had roadways in only small areas of the photo. Copies of all the photos were spread out on a table and edge matched by hand. A visual inspection was done to identify which road intersections could be used and which supplemental control points should be collected. All control points received a unique identification number. The supplemental points were typically fence corners, building corners,

individual trees or other ground features that were well defined on the photos. These points required GPS fieldwork.

Data Collection

The GPS fieldwork was accomplished with Trimble ProXL data collectors operated by Audubon volunteers. The volunteers were given GPS and photo identification training, and were provided with copies of the photos that required additional control. On each photo, the desired control point was circled, numbered and described (such as intersection of two fence-lines or NW corner of barn). The GPS fieldwork was performed in October and November of 1998. There were only two photos that had no discrete points to GPS. Those photos had larger more general photo control points such as, "the end of small peninsula jutting into the lake." Some control points (including road centerline intersections) were visible on more than one photo.

The GPS data were downloaded and differentially corrected using the Montana Department of Transportation's GPS base station data, then exported as ArcView shape files. The new control points along with the GPS road centerline file were imported into ESRI's ArcInfo GIS software where they were used as control for registration and rectification of each photo (see **Figure 2**, Photo Control). The accuracy of the resultant georeferenced infrared aerial photos was not great (+/- 50-75 feet) but that level of accuracy was sufficient for the intended purpose. The idea was to geo-reference the photos so that they could be overlain with other data such as the NWI and soils data.

Producing Map Products Once the digital data were obtained and the photography digitized and geo-referenced, the NWI layer was overlain on the photos and map printed. This map of the NWI outlines on the infrared photos served as a good guide for the wetlands scientists to identify areas that required closer scrutiny. This project required map products for working drafts as well as finished maps for display use in the outreach phase of the project.

Verifying Field GPS Work The juxtaposition of the NWI with the infrared photography allowed the scientists to visually identify areas that required closer inspection. The project team selected two areas to "ground-truth." One was near the lake area and the other was some low lands along and adjacent to a waterway. This ground-truthing task was also used to familiarize volunteers with the vegetation, soils, wildlife and hydrology of wetland areas. To accomplish these tasks a field form was developed for vegetation, soils, wildlife and hydrology. This paper form was adapted to a digital data dictionary and uploaded to a Trimble Pro XL GPS data controller so that additional data could be collected. The GPS collection also simplified digital capture of the information in that the paper forms would not require transcription. The scientists led the field crews of volunteers, all of whom were trained to use the GPS. These data (primarily point data with wetlands attributes), were post-processed, differentially corrected, and exported to an ArcView shape file.

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Project Outcome

The field verification, as well as the GIS overlay maps that showed the NWI with respect to the infrared photography and soils data, showed that the NWI was generally correct, as could be expected at small scales. But the project also revealed the lack of detail in the NWI which is usually necessary for local planning. These results highlighted the need to call in wetlands specialist for specific local projects.

Next Steps

The next phase for the Wetlands Community Partnership Project is to share what it has learned from this project, including discussing the process itself. The partnership is also committed to communicating the importance of wetlands in our community.

This project demonstrated the advantages of GIS and GPS, as well as the use of volunteers to develop and map data. Working under the guidance of trained scientists and a professional land surveyor, the volunteers were able to contribute to the community well-being while learning about wetlands and the latest GIS-GPS technology. In fact the volunteers, some of whom had no prior computer or surveying experience, were very enthusiastic about using the GPS gear and were quite adept by the end of the project.

Figure 2: Photo Control

RJ ZIMMER *is the GIS Coordinator for Lewis & Clark County and the City of Helena, Montana, and a Contributing Editor for the magazine.*

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Helena Valley Wetlands

A Seminar

Presented by the Wetlands Community Partnership

(Montana Audubon; Last Chance Audubon; Montana Wetlands Trust; Pamala Hackley, Soil Scientist; Lewis and Clark County Water Quality Protection District; Lewis and Clark County Information Services; and Lewis and Clark County Planning Department)

Monday, May 22, 2000, 5 p.m. - 9 p.m.
Carroll College Campus Center

5:00 - 6:00	Wetlands in the Helena Valley - Results of Two-year Study What's there? How important are wetlands? How do they affect me?
6:00	Dinner
6:45 - 8:00	Other Watershed Projects in the Helena Area Lake Helena, Valley Aquifer, Tenmile Creek Watershed, Prickly Pear Creek Watershed
8:00 - 9:00	Next Steps for Helena

There is no charge for the seminar or dinner.
Please call the Water Quality Protection District,
447-1668, by May 16, to make reservation

(Press Release)

WETLANDS PROTECT US ALL!

What is so special about wetlands? Aren't they the wastelands that Grandpa has been trying to dry up and farm for the last 50 years? Today we recognize that wetlands are not wastelands and that they serve a very important role in keeping our surface and groundwater clean. Whether they are catching pesticides from cropland or automobile pollutants from parking lot stormwater, wetlands filter and cleanse contaminated runoff before it reaches our surface water and aquifers.

Wetlands serve a variety of functions aside from filtering pollutants. Wetland vegetation acts as a sponge to soak up floodwaters, reducing downstream river velocities and destruction of streambanks and private property. This excess water is instead stored in the wetland and released to adjacent streams or water bodies during late summer when stream flows are down. Holding this excess spring runoff water also allows it to percolate into the groundwater supplies, replenishing aquifers so they are better able to meet well water demands. Wetlands also furnish shrubs and trees that can shelter livestock. And don't forget that these areas also provide the necessary habitat for many species of waterfowl, reptiles, amphibians, and mammals.

WETLANDS CAN BE PONDS BUT PONDS MAY NOT BE WETLANDS

An abandoned gravel pit that fills up with water or an excavated pond that has surface water diverted into it, is not a true wetland. These water bodies may serve the needs of wildlife if vegetative cover is allowed to grow around the banks, but they do not serve most wetland functions. While pond construction may make for better duck hunting come fall, one should consider what is to be gained by conserving, enhancing, restoring or even constructing "true" wetlands. All types of wetlands are needed to provide adequate protection to our water resources.

Wetlands provide benefits to all parts of Lewis and Clark County, whether it is on ranch far from the city center, agricultural land on development's fringe, or land that is already developed for city-dwellers. Representatives of several local groups, including the Gallatin Valley Land Trust, Sacajawea Audubon, NRCS in Bozeman, Gallatin Conservation District, Montana Department of Fish, Wildlife and Parks, City of Bozeman Planning Department, Gallatin County Planning Department, Gallatin County Local Water Quality District, Montana DEQ Wetlands Program, along with Montana Watercourse at MSU and the Wetlands Community Partnership

in Helena, have developed a workshop which addresses wetlands in all of the above scenarios.

Gallatin Valley Wetlands: Worth Protecting will be Wednesday, May 24, at the Wingate Inn, 2305 Catron Boulevard (next to Costco), from 1 p.m. to 9 p.m. There will be displays, speakers, dinner, and a field trip.

Agenda (Draft):
2-3 p.m. Keynote Speaker, Steve Custer, Ph.D, The WOW of Wetlands
3-5:30 p.m. - Wetlands Field Trip
5:30-6:30 p.m. - Dinner, w/ Mayor Marcia Youngman, featured speaker
6:30-8:00 p.m. - Breakout sessions
    Working with Wetlands, Tools for Conservation
    Planning for Wetlands, Tools for Management
    What One Community is Doing, Wetlands Community Partnership, Helena
8:00-9:00 p.m. - Next Steps, Planning for our Community

There is no charge for the seminar or dinner. Call 994-6634 to reserve your space by May 15.

Wetlands in the Helena Valley

A Seminar

AGENDA

Monday, May 22, 2000

5 p.m. - 6 p.m.
Welcome - Karolin Loendorf, Lewis and Clark County Commissioner
Wetlands Community Partnership - Pamala Hackley and Charles van Hook
Results of two-year project - assessing, mapping, and uncovering the history of the Helena Valley wetlands

6 p.m.
Dinner Break

6:45 p.m. - 8 p.m.
Overview of Other Watershed Protection Projects in the Helena Area
Tenmile Creek Watershed - Jesse Aber, Montana Department of Natural Resources and Conservation; Mike Bishop, U.S. EPA
Prickly Pear Watershed - Lex Riggle, National Resources and Conservation Service
Helena Valley Aquifer - Kathy Moore, Lewis and Clark County Water Quality Protection District
Lake Helena - Gayle Joslin, Montana Department of Fish, Wildlife and Parks
Wetlands - Impacts of Fragmentation - Rob Hazlewood, U. S. Fish and Wildlife Service

8 p.m. - 9 p.m.
Next steps for Helena - Kathy van Hook, facilitator
Overview of Phase II Wetlands Project
Wetlands resources, contacts
Town Meeting

Seminar Sponsored by
Montana Wetlands Community Partnership:
Montana Audubon
Last Chance Audubon
Montana Wetlands Trust
Pamala Hackley, Soil Scientist
Lewis and Clark County Water Quality Protection District
Lewis and Clark County Information Technology and Services
Lewis and Clark County Planning Department

THANK YOU to Montana Department of Fish, Wildlife and Parks for sponsoring our meal

Wetlands in the Helena Valley

A Wetland Community Partnership Project

Helena Valley Wetlands Seminar Evaluation Form

May 22, 2000

Thank you for your interest in wetlands! The workshop sponsors and presenters would like your assistance in providing the following information. Please take a few minutes to complete this evaluation form, as it will insure that these programs will continue to be of value to participants. **(Your name is not necessary on this form.)**

Background:

Circle your answer:

☞ Did the offer of a meal influence your decision to attend the workshop? Yes No

☞ How far did you travel for this workshop? _____mile(s).

☞ How did you hear about this workshop (newspaper, flyer, etc)?_____

Evaluation:

☞ Rate the workshop on a scale of 1 to 6. 6=excellent and 1=poor: _____

☞ What was the most useful information presented at the workshop? Why?

☞ Were the workshop goals clearly stated and covered? Yes No

☞ What were the best features of the workshop? _____

☞ Ways in which the workshop could be improved? _____

☞ Would you attend a follow-up workshop? Yes No

☞ Any other comments, suggestions, requests and/or concerns (feel free to use the backside of this sheet)?

_____

_____

_____

Wetlands in the Helena Valley
Questionnaire

Please consider the following question and jot down any thoughts that you might have. Later in the evening we will ask you to hand your response in so that our wetlands panel can address your concerns. If you would rather receive a personal response later by phone or email, please make a note on your form.

* **What are your greatest issues or concerns regarding wetlands in the Helena area?**

Optional Contact Information

Name _____ Phone _____

Mailing Address _____ City/Zip _____

Email Address _____

INDEPENDENT RECORD

Sunday, May 21, 2000 ■ HELENA, MONTANA ■ VOL 56, NO. 170 ■ SEVENTY-FIVE CENTS

Study shows loss of area wetlands habitat substantial

By MARTIN J. KIDSTON
IR Staff Writer

"The state and each person shall maintain and improve a clean and healthful environment in Montana for present and future generations."
— Montana Constitution, Section I, Article IX

The morning cry of a loon, the rising mist, the patter of a dragonfly and the deep air that smells of reeds, cattails and the very essence of organic life.

At first glance, these are Montana's wetlands in their simple, innate form — but there's more to these fertile grounds than reaffirming beauty.

Montana's vast prairies to the east and high, glacial valleys to the west are home to an array of wetland environments, and Helena, lying somewhere in between, depends upon these natural buffers — the importance of which wasn't known until recently.

While an estimated 27 percent of Montana's wetlands have been lost to development and agriculture, according to figures from the Environmental Protection Agency, the nation has lost more than 50 percent of its wetlands, or 60 million acres.

Though exact figures have not been compiled for the Helena Valley, soil scientist and wetland specialist Pamela Hackley estimates the loss to be substantial.

In 1998, the Lewis and Clark County Water Quality Protection District received a grant from the EPA and the state Department of Environmental Quality to find out just how substantial that loss really was.

Under the direction of the Wetlands Community Partnership, Hackley, joined by a team of biologists representing various organizations, set out to gain an historic perspective on the area's native wetlands and to map the location of those that remain.

Uncovering a land survey map dating back to 1868

More **WETLANDS,** *page 12A*

Martin Kidston *IR Staff Photographer*
THE EAST FORK of McClellan Creek in the Elkhorns supports a rich wetland system.

became a useful tool in establishing that history, Hackley said, and put the loss of the valley's wetlands over the last 132 years into perspective.

The land survey suggests that extensive wetlands existed around the low-lying areas of the Valley, the lowest point being the Lake Helena area, which once sustained the richest wetlands of all. Hackley said there is also evidence that a system of continuous wetlands ran the stretch of Prickly Pear, Tenmile, Sevenmile and Silver creeks as they flowed into the Valley.

Now, she said, all that remains is a broken, fragmented system that clings to the shores of several local creeks.

"The loss of our wetlands over time has been significant," she said.

Hackley said Helena's wetlands provide several key functions, such as flood control and groundwater recharge. They also serve as a filter, sifting out pollutants like nitrates and toxins, while collecting the sediments that can cloud area rivers and lakes, causing fish productivity to drop.

According to the Landowner's Guide to Montana's Wetlands, published by the Montana Watercourse, wetlands serve as flood control mechanisms in their ability to reduce the velocity of floodwater, which also slows down bank erosion during high flow.

Charles Van Hook of the Montana Wetlands Trust believes this function of Helena's wetlands — flood control — was the most vital of all.

"We think the presence of wetlands along stream corridors helped modify floods by absorbing and storing water, slowing floodwaters down and reducing the rate of bank erosion," Van Hook said. "Flood control is one function that we believe served the utmost value to this area."

Not only do wetlands slow seasonal flooding, Hackley said, but they also serve as a recharge source for the Valley's aquifer.

With their ability to absorb large amounts of water, wetlands gradually release that water into adjacent streams during periods of low flow. Also, by storing water in this manner, wetlands allow the water to seep into underlying soils, replenishing groundwater supplies.

Then there's the power of wetlands to filter toxins from the environment — a process, Van Hook said, that will become more significant as urban growth spreads within the Valley.

Wetlands serve as filters, Van Hook said, keeping toxins like runoff from lawns and golf courses treated with fertilizer from reaching area rivers and streams.

"It's a huge, organic filter — it's a natural water purifying machine," Van Hook said. "If the wetlands are allowed to exist, they will help clean your water."

Van Hook attributed the filtering power of wetlands to the nitrogen and phosphorous-eating bacteria living in the slimy mud under the water. This type of bacteria, Van Hook said, converts contaminants into harmless organic matter. The plants found in wetlands also assist in the purifying process, viewing hazardous nitrates as a source of food.

With the near completion of a detailed mapping project of the Valley — one that contains a composite of 79 aerial photos — looking at the landscape has never been easier, nor has protecting the future.

Both Hackley and Van Hook agree, with the mapping project nearly complete, county officials, planners, developers and conservationists can now work together to protect those wetlands that remain, and to restore those that have been lost in the name of progress.

"The community needs to address the problem through future planning," Van Hook said. "This community needs wetlands, and if we rip something up to build, we should replace and restore what we have destroyed."

INDEPENDENT RECORD

Sunday, May 21, 2000 ■ HELENA, MONTANA ■ VOL 56, NO. 170 ■ SEVENTY-FIVE CENTS

Fastfacts

Types of Wetlands

■ Riverine Wetlands are associated with the flowing water of rivers and streams, such as sloughs, meanders, and the margins of rivers and creeks.

■ Depressional Wetlands are low spots on the landscape, such as glacial and prairie potholes, saline basins, wet meadows and ponds.

■ Lacustrine Fringe Wetlands are associated with lakes or deep-water habitats, like margins around mud flats, lakes and ponds.

■ Slope Wetlands are considered groundwater discharge areas in sloping wetland meadows, springs and sub-alpine areas at higher elevations.

■ Artificial Wetlands are created by human-related activities, such as seeps along irrigation canals (I-90 below Opportunity Ponds).

Important facts about wetlands:

■ Naturally purify the water by absorbing various nutrients, such as nitrates, and are home to bacteria that feast on sediments and toxins.

■ Recharges wells and aquifers by storing surface water long enough to allow the water to percolate into underlying soils.

■ Provides vital habitat for thousands of species of plants and birds – in Montana, 39 percent of the state's endangered species are found in, or depend upon wetlands.

■ Provides shallow spawning grounds for fish, offering shelter and food.

■ Provides water and forage for livestock.

■ Reduces the velocity of floodwaters and slows bank erosion, minimizing property losses.

Losing wetlands would:

■ Lead to a decline in area-wildlife populations

■ Increase sedimentation and nutrient levels in local lakes and streams

■ Lead to contaminated drinking water and irrigation wells

■ Increase the costs of treating drinking water

■ Reduce fish productivity due to poor water quality and habitat loss

■ Lower water tables

Wetland assistance programs and conservation organizations in the Helena area

■ MARSH; offers financial assistance through Ducks Unlimited for wetland preservation; contact Steve Bayless at 406-458-5794, or by e-mail at mrshcrkfrm@aol.com

■ Montana Migratory Game Bird Stamp Program; offers financial assistance through MDFWP for wetland preservation; contact Jeff Herbert at 406-444-2612, or by e-mail at jherbert@mt.gov

■ Prickley Pear Land Trust; establishes conservation easements; contact Jerry Debacker at 406-443-5705, or by e-mail at debacker@mt.net

■ Montana Wetlands Trust; establishes conservation easements; contact Charles Van Hook at 406-442-3199, or at 406-431-2098

INDEPENDENT RECORD

MONDAY, OCTOBER, 23, 2000 ■ HELENA, MONTANA ■ VOL 56, NO. 327 ■ FIFTY CENTS

Conservationists to unveil wetlands study results

By MARTIN J. KIDSTON
IR Staff Writer

Like many places across the state, wetland habitat in the Helena Valley has been disappearing under the weight of development.

Now, however, conservationists have a new tool to use in protecting what remains of the valley's wetlands, and in restoring those that have been lost in the name of progress.

In 1998, the Lewis and Clark County Water Quality Protection District received a grant from the Environmental Protection Agency and the Montana Department of Environmental Quality to find out how substantial the loss of the valley's wetlands has been.

Under the direction of the Wetlands Community Partnership, a team of biologists set out to measure the loss of area-wetlands and to map those that remain.

Now, the efforts of that program are nearly complete, and on Tuesday night Charles Van Hook of the Montana Wetland Trust will present many of the findings by comparing an 1868 land survey of the Helena Valley with the results of the new maps.

WETLANDS MEETING
Tuesday, Oct. 24, at 7p.m. at the Lewis and Clark County Library.

Using a slide show overlaid with computer-generated graphics taken with aerial infrared photos, Van Hook will illustrate the changes that have occurred to the Valley's wetland habitat.

Van Hook said the mapping project was years in the making and, in June at the height of the wetland study, soil scientist and wetland specialist Pamela Hackley said the 1868 land survey of the Helena Valley had played an instrumental part in the project.

Hackley said the survey, used as a comparison, suggests that extensive wetlands once existed around the low-lying areas of the Helena Valley, especially around Lake Helena.

A system of wetlands also ran the stretch of the Prickly Pear, Tenmile, Sevenmile and Silver creeks as they flowed into the Valley, Hackley said.

Now, Hackley said, all that remains of those wetlands is a broken, fragmented system.

"The loss of our wetlands over time has been significant," Hackley said. "We often see the filling in of wetlands as commercial or urban development goes in on top of them."

Hackley said the Valley's wetlands provided such functions as flood control and groundwater recharge. They also help filter pollutants from groundwater, such as nitrates, toxins and sediments, which can cause fish

More **WETLANDS**, *page 7A*

Wetlands

continued from 1A

productivity to drop in rivers and lakes.

According to the Landowner's Guide to Montana's Wetlands, published by the Montana Water-course, wetlands serve as flood and erosion control in their ability to reduce the velocity of floodwater.

Van Hook said perhaps this — flood control — was their most important function.

"We think the presence of wetlands along stream corridors helped modify floods by absorbing and storing water," Van Hook said. "Flood control is one function that we believe served the utmost function to this area."

However, Van Hook said, as urban growth continues to spread, the ability of wetlands to filter toxins will become increasingly important.

Runoff from golf courses and lawns treated with fertilizers, runoff from parking lots and roads with their grease and grime, and general pollution has to go somewhere, Van Hook said.

"(Wetlands) are a huge, organic filter — it's a natural water purifying machine," Van Hook said. "If the wetlands are allowed to exist, they will help clean our water."

In June, Hackley and Van Hook were hopeful that once the mapping project was complete, county officials, planners, developers and conservationists could work together in protecting the valley's wetlands, and restoring those that have been lost.

"The community needs to address the problem through future planning," Van Hook said. "This community needs wetlands, and if we rip something up to build, we should replace and restore what we have destroyed."

While 27 percent of Montana's wetland habitats have been lost to development over the years, the national average is much higher — nearly 50 percent, or 60 million acres, according to the Environmental Protection Agency.

Van Hook's presentation is sponsored by the Kelsey Chapter of the Montana Native Plant Society and is free to the public.

Reporter Martin Kidston *can be reached at 447-4086, or by email at mkidston@helenair.com*

INDEPENDENT RECORD

SATURDAY, OCTOBER 21, 2000 ■ HELENA, MONTANA ■ VOL 56, NO. 325 ■ FIFTY CENTS

Program to explore Helena Valley wetlands

Charles VanHook will present a program entitled: "Sherlock Holmes in the Wetlands of the Helena Valley" Tuesday Oct. 24, at 7 p.m. in the Lewis and Clark Library

Using a slide show overlain with computer generated graphics from aerial infrared photographs, VanHook will illustrate the changes that have occurred in the Helena Valley wetlends since 1968 when the first survey work was done.

The Bureau of Reclamation conducted a massive wetland drainage project and the results of that will be shown over the map of the 1968 survey. The wetland area located around the present fairgrounds will be discussed and conservation measures and policy will be addressed.

VanHook has been working in the Helena Valley for several years as part of a joint project to inventory and map the wetlands of the Valley. Partners in the project include Montana Wetland Trust, Montana Audubon, Lewis and Clark County Water Quality district and Pam Hackley.

VanHook's presentation is sponsored by the Kelsey chapter of the Montana Native Plant Society and is free and open to the public.

INDEPENDENT RECORD

MONDAY, OCTOBER, 23, 2000 ■ HELENA, MONTANA ■ VOL 56, NO. 327 ■ FIFTY CENTS

Plant society teams up with wetlands project

By MARTIN J. KIOSTON
IR Staff Writer

Plants, wetlands and history will come together Tuesday night as a detailed land survey of the Helena Valley comes to a close.

The land survey was part of a joint project conducted by the Montana Wetlands Trust, Montana Audubon Society, Lewis and Clark County Water Quality District and soil and wetland scientist Pam Hackley.

But while the Valley's diminishing wetlands will be the theme Tuesday night, the Kelsey Chapter of the Montana Native Plant Society continues to complete a land survey of its own – the preserving and study of area plants.

Kathy Lloyd of the Montana Native Plant Society said the organization is a statewide nonprofit group formed in 1987, and is sponsoring Tuesday night's wetland presentation.

"We conserve and preserve Montana's native plant species," Lloyd said. "One of the main things the local chapter has done is to establish a flora collection of Mount Helena, which is housed in the Lewis and Clark Public Library. We have collected nearly 300 vascular plants found on Mount Helena alone."

The collection of vascular plants – or non-fungal plants, according to Lloyd – includes trees, shrubs, grasses and flowers. The plant species are filed in a cabinet for public reference.

The Montana Natural Heritage Program, which publishes a list of species known as the Sensitive Plant List, helps state and federal agencies, along with local entities, identify plants found on various listings, such as sensitive, endangered, and watch listings.

"One of the species that is found on Mount Helena that is found on the special concern list is known as Astragalus convallarius, or the lesser rushy milkvetch," Lloyd said, adding that the plant is in the bean family and often resembles a pea pod. "There are 11 different species of the plant on mount Helena."

Other local plants on the list include Klaus' bladderpod – a member of the mustard family. Lloyd said the bladderpod was "state endemic," or native only to Montana.

Another plant, known as the rabbit foot crazy weed, is found in the Helena valley. Although the rabbit foot crazy weed was once thought to be a state endemic plant, like the bladderpod, it was recently discovered growing in Alberta, Canada.

The limestone larkspur is also local and can be found on the sensitive plant list.

"Cataloging is important because our knowledge of flora, as with all biological systems, is still limited," Lloyd said. "The program has been set up to do this work so agencies and groups can contact them to find out where these plants are, so that any activity that may impact the population of them can be known."

Wetlands Workshop

The Bitterroot Connection

<u>Friday night April 14</u>

- Discover the beauty of wetlands along with their value and functions
- Bitterroot wetlands issues

<u>Breakout Sessions on Saturday, April 15</u>

- How to know if you have a wetland .... and what to do if you have one
- Wetlands and the watershed (water rights and ponds)
- What one Montana community is doing

Plus displays, lunch, and a field trip

Friday, April 14 7-9 p.m.
Saturday, April 15, 8 a.m. to 3:30 p.m.
Community Center at the City Hall, Hamilton
Lunch $7.50

Call (406) 363-5010, Ext. 114 by April 10
to reserve your lunch
There is no charge for the workshop

PRESS RELEASE

1930 Ninth Avenue • Helena, MT 59601 • (406) 443-2584 • Fax: (406) 447-1665

FOR IMMEDIATE RELEASE

Date: March 15, 2000
Contact: Linda Dworak, 363-6489; Sharon Ritter, 375-9150; Roxa French, 363-5010, ext.114; Susan Palermo, (406) 447-1668

WETLANDS: ARE THEY DISAPPEARING FROM THE BITTERROOT?

Hamilton, MT—What is so special about wetlands? Aren't they the wastelands that Grandpa has been trying to dry up and farm for the last 50 years? Today we recognize that wetlands are not wastelands and that they serve a very important role in keeping our surface and groundwater clean. Whether they are catching pesticides from cropland or automobile pollutants from parking lot stormwater, wetlands filter and cleanse contaminated runoff before it reaches our surface water and aquifers.

Wetlands serve a variety of functions aside from filtering pollutants. Wetland vegetation acts as a sponge to soak up floodwaters, reducing downstream river velocities and destruction of streambanks and private property. This excess water is instead stored in the wetland and released to adjacent streams or water bodies during late summer when stream flows are down. Holding this excess spring runoff water also allows it to percolate into the groundwater supplies, replenishing aquifers so they are better able to meet well water demands. Wetlands also furnish shrubs and trees that can shelter livestock. And don't forget that these areas also provide the necessary habitat for many species of waterfowl, reptiles, amphibians, and mammals.

WETLANDS CAN BE PONDS BUT PONDS MAY NOT BE WETLANDS

An abandoned gravel pit that fills up with water or an excavated pond that has surface water diverted into it, is not a true wetland. These water bodies may serve the needs of wildlife if vegetative cover is allowed to grow around the banks, but they do not serve most wetland functions. While pond construction may make for better duck hunting come fall, one should consider what is to be gained by conserving, enhancing, restoring or even constructing "true" wetlands. All types of wetlands are needed to provide adequate protection to our water resources.

Wetlands provide benefits to all parts of Ravalli County, whether it is on ranch land far from a city center, agricultural land on

development's fringe, or land that is already developed for city-dwellers. Representatives of several local groups along with MSU and the Wetlands Community Partnership in Helena have developed a workshop which addresses wetlands in all of the above scenarios. The Bitterroot Valley Wetlands Workshop will be Friday, April 14, and Saturday, April 15, at the Community Center in the City Hall, Hamilton. Come to the workshop where you will learn about:

<u>On Friday night, April 14</u>

- The value, functions and beauty of wetlands, including the Bitterroot connection

<u>On Saturday, April 15</u>

- How to know if you have a wetland -- and what to do if you do
- Wetlands and the watershed -- all about ponds and water rights
- What one Montana community group is doing -- Wetlands Community Partnership in Helena
- A field trip to a local wetland

There is no charge for the workshop but you must pre-register. Call 363-5010, ext. 114, by April 10 to register and to sign up for an optional lunch, which is $7.50.

Wetlands Workshop -- The Bitterroot Connection

AGENDA

Friday, April 14

6:30 p.m. Register for Workshop/Lunch
Displays Open

7:00 p.m. Welcome, Drew Overholser, Montana Watercourse
Overview of Workshop
Introduce Workshop Sponsors

7:15 p.m. **Wetlands - The Bitterroot Connection**
Brad Cook, Flathead Lake Biological Station

7:45 p.m. **State of Wetlands in the Bitterroot and Options for the Future**
Moderator: Roxa French, Bitter Root Water Forum
Tom Hinz, Montana Department of Fish, Wildlife and Parks
Chris Clancy, Montana Department of Fish, Wildlife and Parks
Alan Steinle, U. S. Army Corps of Engineers
Brian Maiorano, Missoula County Floodplain Administrator
Clint Brown, Water Consulting, Inc.
Bruce Farling, Montana Trout Unlimited

9:30 p.m. Wrap-up, View Displays, Adjourn

Saturday, April 15

8:00-9:00 a.m. Register for Workshop/Lunch
Coffee, View Displays

9:00 a.m. Welcome, Roxa French, Bitter Root Water Forum
Overview of Schedule
Wetlands in Context of Bitterroot Concerns

9:20 a.m. Breakout Sessions (9:30-10:10; Break; 10:30-11:10; 11:15-11:55
Session I - Water Rights, Ponds - Social and Ecological Trade-offs
Moderator, Roxa French, Bitter Root Water Forum
Mike McLane, Montana Department of Natural Resources and Conservation
Brad Cook, Flathead Lake Biological Station
Session II - Wetlands 101
Moderator, Drew Overholser, Montana Watercourse
Rob Hazlewood, U. S. Fish and Wildlife Service
Brad Collins, Bitter Root Land Trust
Session III - Helena's Wetlands - What One Community is Doing
Moderator, Ravalli County Land Services Department
Pamala Hackley, Wetlands Community Partnership

12:00-12:45 p.m. Lunch; View Displays

1:00-3:30 p.m. Field Trip, Rob Hazlewood, U. S. Fish and Wildlife Service; Roxa French, Bitter Root Water Forum; Clint Brown, Water Consulting, Inc. (Transportation Provided)

Workshop Sponsors: Bitterroot Audubon; Bitter Root Land Trust; Bitter Root Water Forum; Harry LaFriniere; Highway 93 Wetlands & Stream Team; MT DEQ Wetlands Program; MT DNRC; USFWS, Lee Metcalf National Wildlife Refuge; Teller Wildlife Refuge; Ravalli County Land Services Department; Wild Covenants; Montana Watercourse, MSU; Wetlands Community Partnership, Helena

Wetland Stewardship Workshops-Evaluation Form Summary

Workshop Location: Hamilton, MT. Date: 04-16-00

Background:

Amount of workshop attended: 7/7 attended both days
Was a tour offered? Yes, 5/7 attended
Was a meal offered? Yes. Would the offer of a meal influence your decision to attend the workshop? No, 7/7
Distance traveled for the workshop: Between 1-45 miles
How did you hear about this workshop? Newspaper, Flyers, E-mail, etc.

Evaluation:

Rating of the workshop on a scale of 1 to 6. Most ratings were 5 or higher.

What was the most useful information presented at the workshop? Comments included appreciation for the well-informed presenters, use of scientific data, and the variety of issues covered.

All workshop attendees found the workshop goals clearly stated and covered.

What were the best features of the workshop? The clear and concise presenters were rated overall as the best features, while the field tour and the quality of information were also noted.

Ways in which the workshop could be improved included increasing time allotments for presenters, and encouraging more public awareness through local newspapers.

All workshop attendees stated interest in attending a follow-up workshop.

Other comments, suggestions, requests and /or concerns included desire for a greater exchange of ideas and goals for wilderness improvements, and continued public education of the issues.

WETLANDS

in the FLATHEAD VALLEY

Wetlands Stewardship Workshop

- the beauty and value of wetlands
- How you can protect them
- Incentives to help

Presentation by panel of wetlands experts
followed by field trip

12:30 p.m., May 31, 2000
Fish, Wildlife and Parks Building
490 North Meridian, Kalispell

There is no charge for the workshop, but space is Limited.
Call 752-0081 by May 15
to make your reservation

Flathead Wetland Workshop

Fish, Wildlife and Parks
490 North Meridian, Kalispell

Agenda

May 31, 12:30 p.m.

12:30 pm Welcome and Introductions: Susan Palermo, Wetlands Community Partnership, Helena, and Shona Campbell, Montana Watercourse

12:40 pm The Wonders of Wetlands: Lynda Saul, Wetlands Coordinator, Montana Department of Environmental Quality

1:00 pm Wetlands Community Partnership, Helena: Charles van Hook

1:20 pm Load buses and depart

Wetland Tour:
2:00 pm Introduction: Jean Robacker, property owner, and Marilyn Woods, The Nature Conservancy

2:30-4:00 pm Tour Stations:

#1. Stream Permitting, Cathy Jones, Flathead Conservation District
#2. Wetland Delineation by Plants, Maria Mantis, US Forest Service
#3. Wetland Delineation by Soils, Charles van Hook, Wetlands Community Partnership, Helena
#4. Wetland Rules and Tools, Doug McDonald, US Army Corps of Engineers

4:00 pm Mitigation and Financial Incentives, Charles van Hook and Doug McDonald

4:20 pm Q & A, All participants

4:30 pm Load bus and depart for home

(OVER)

Wetlands Resources and Contact People

Neal Brown, Flathead Audubon
837-5018
nealpatt@cyberport.net

Mark Holston, Flathead Basin Commission
Flathead Basin Commission
33 2nd Street East
Kalispell, MT 59901
752-0081, fbc@digisys.net

Susan How
Flathead Land Trust
752-8293, fltbigsky.net

Cathy Jones, Flathead Conservation District
30 Lower Valley Road
Kalispell, MT 59901
752-4220
fcd@digisys.net

Doug McDonald, U.S. Army Corps of Engineers
301 South Park
Helena, MT 59601
441-1375
Mmcdonald@mt.usda.gov

Maria Mantas, U.S. Forest Service
758-5337
mmantas@fs.fed.us

Brent Mitchell, Flathead Audubon
756-8130, bkmitch@bigsky.net

Eric Mulcahy, FRDO
758-5980
emulcahy@co.flathead.mt.us

Drew Overholser & Shona Campbell,
MT Watercourse
201 Culbertson Hall, MSU
Bozeman, MT 59717
994-6634
drewo@montana.edu

Susan Palermo, Lewis & Clark County Water Quality Protection District
1930 Ninth Avenue
Helena, MT 59601
447-1668, spalermo@co.lewis-clark.mt.us

Jean Robocker
1655 Montfort Road
Kalispell, MT 59901
756-6344, cjeanr@digisys.net

Rox Rogers, U.S. Fish and Wildlife Service
758-6868, Ext. 32
Rox_Rogers@fws.gov

Joe Russell, Flathead County Health Officer
758-5749
jrussell@co.flathead.mt.us

Lynda Saul, MT DEQ
Wetlands Coordinator
1520 E. Sixth Ave., P.O. Box 200901
Helena, MT 59620-0901
444-6652, lsaul@state.mt.us

Charles van Hook, MT Wetlands Trust
517 Waukesha
Helena, MT 59601
442-3199, CvanHook@aol.com

Marilyn Woods
The Nature Conservancy

Flathead Valley Wetlands Workshop Evaluation Form

May 31, 2000

Thank you for your interest in wetlands! The workshop sponsors and presenters would like your assistance in providing the following information. Please take a few minutes to complete this evaluation form, as it will insure that these programs will continue to be of value to participants. **(Your name is not necessary on this form.)**

Background:

☞ How far did you travel for this workshop? _____mile(s).

☞ How did you hear about this workshop (newspaper, flyer, etc)?_____

Evaluation:

☞ Rate the workshop on a scale of 1 to 6. 6=excellent and 1=poor:

_____

☞ What was the most useful information presented at the workshop? Why?

☞ What were the best features of the workshop?

_____

☞ Ways in which the workshop could be improved?

_____

☞ Would you attend a follow-up workshop? **Yes** **No**

☞ Any other comments, suggestions, requests and/or concerns (feel free to use the backside of this sheet)?

_____

_____

_____

_____

Gallatin Valley Wetlands: Worth Protecting

A Practical Wetlands Stewardship Workshop

1-2 pm: ♦Registration and Displays Open

2-3 pm: ♦**Welcoming and Introduction**--Drew Overholser, *Montana Watercourse*
♦**Wetlands 101: "If it's wet, it's wet"**--Steve Custer, *Montana State Univ.*

3-5:30 pm: ♦**Wetlands Tour of the Hines' Residence**--Pat Byorth, *Montana Fish, Wildlife and Parks*, Tom Hinz, *Montana Fish, Wildlife and Parks*, Tony Rolfes, *USDA--Natural Resource and Conservation Service*, Cyndi Crayton, *Gallatin Local Water Quality District* and Eric Atkinson, *Marmot's Edge Conservation*

5:30-6:30 pm: ♦Dinner featuring keynote speakers Marcia Youngman, *Mayor of Bozeman* and Steve Forrest, *Gallatin County Planning Board*

6:30-6:40 pm: ♦Short Break

6:45-8:15 pm: ♦**Break-out Sessions:** Participants may attend two of the following:

1. **"Working with Wetlands"**--*Landowner Toolbox*: A discussion covering some of the wetland programs and options available to landowners including conservation easements and the Wetland Reserve Program. The panel will include:
   - Debbie Deegan, *Gallatin Valley Land Trust*
   - Dave Heilig, *USDA--Natural Resource and Conservation Service*
   - Drew Overholser, *Montana Watercourse*

2. **"Planning for Wetlands"**--Rules and Tools: A panel discussion targeting local decision -makers, planners, developers and interested citizens. Topics will include wetland regulations, planning tools and local issues. The panel will consist of:
   - Jody Olsen, *Bozeman Planning Office*
   - Gene Graff, *Bozeman Area Landowner and Developer*

3. **Community Wetlands Partnership, Helena**—A Community Wetland Project
   An interesting presentation on how one Montana community is inventorying their wetlands and looking to the future by using historical maps and GIS technology.
   - Charles van Hook, *Wetlands Community Partnership, Helena*

8:20 pm-9 pm: ♦**Next steps for the Gallatin Valley**: *Where to go and how to get there?* - If you could make the decisions that would determine the future of wetlands in this valley, what would you do? Well, come and tell us. This discussion will be moderated by:
- Lynda Saul, *Montana Department of Environmental Quality*
- Duncan Patton, *Gallatin County Resident and Riparian Ecologist*

Workshop sponsors include Sacajewea Audubon, the Gallatin Local Water Quality District, Gallatin County Planning Office, NRCS, Gallatin Conservation District, Bozeman Planning Office, Gallatin Valley Land Trust, Montana Dept. of Fish, Wildlife and Parks, Montana DEQ and the Bozeman Watershed Council along with Montana Watercourse at MSU and the Wetlands Community Partnership in Helena

Wetlands and Fish Ponds

Wetlands:

Shallow – less than 6' deep
High Biological Productivity and Diversity
Slow Turnover Time
Groundwater versus Surface Water

Fish Ponds:

Deeper – must be over 12' deep to overwinter fish
Lower biological productivity – less littoral exposure to sun,
Faster Turnover Time
Often require surface water appropriations to maintain oxygen
Less Biological Diversity

Replacing Wetlands with Artificial Fish Ponds Generally Decreases Biodiversity, Filter Function, and Diminishes Benefits to Water Quality.

Problems with Fish Ponds:

Increase thermal loading of stream systems,
Dewater streams, increasing evaporation,
Increase nutrient loading of streams,
Reduce cover, habitat for a variety of birds, mammals, amphibians, and invertebrates,
Stocked hatchery fish present genetic, potential disease threats to wild fish communities,
Disrupt sediment delivery and fish passage when built on-stream.

Compiled by: Pat Byorth, Fisheries Biologist
Montana Department of Fish, Wildlife and Parks

Wetlands in the Helena Valley

A Wetland Community Partnership Project

Why are wetlands important?
How many wetlands are there in the Helena Valley and where are they located?

A unique partnership, the ***Wetlands Community Partnership Project***, has formed in the Helena area to help us better understand our wetland resources by answering these and other important questions.

For many years, wetlands were thought of as a waste of productive land. Today, citizens are realizing the important role that wetlands play in our natural environment.
We now understand that wetlands -

- *Play a major role in protection against flooding*
- *Naturally improve water quality by filtering out sediments and pollutants*
- *Support an amazing diversity of fish and wildlife species*
- *Recharge our groundwater supplies*

The following are answers to some questions about the ***Wetlands Community Partnership Project***:

What

Participants in the project will inventory and map existing and historic wetlands in the Helena area. They will also develop education programs and outreach efforts to teach people about wetlands and their importance to our local community.

Who

The Wetland Community Partnership is made up of Helena area professionals, local government agencies and nonprofit organizations. Specifically, the partners forming this project include:

Last Chance Audubon Society
Lewis & Clark County Information Technology and Services
Lewis & Clark County Planning Department
Lewis & Clark County Water Quality Protection District
Montana Audubon
Montana Wetlands Trust
Pamala Hackley, Soil Scientist

Citizen volunteers and landowners will also be involved in information gathering and public outreach.

Where

This 2-year project will focus on the Helena Valley and surrounding area, encompassing approximately 100 square miles.

(over)

How

The project consists of three main components:

- The project will begin with a "paper inventory" of probable wetland locations. The initial search will include National Wetland Inventory maps, aerial photographs, soil surveys, and historic maps. From this information, a baseline map will be created. Professional wetlands scientists will work with volunteers on aerial photography interpretation and mapping techniques of both historic and existing wetlands.

- Once the base maps are complete, as many areas as possible will be ground checked to determine the accuracy of the information. Baseline maps can be greatly improved by field review. Again, professional wetland scientists will work with volunteers on all field checks.

- Throughout the project, progress will be featured in the newspaper, at the county fair, and other events as well as during volunteer training sessions. An additional part of the public outreach program will be to present the findings to the greater Helena community and other interested parties.

Why

The wetland maps developed through this project will be tools to help landowners preserve or restore wildlife habitat. When the importance of these areas is understood, wetlands are often restored and protected when it is affordable and technical help is available to do so. Wetland conservation is desirable for a variety of reasons including improving water quality, protection against flooding, providing habitat for wildlife, and leaving valuable resources for future generations. One of our goals is to help interested landowners learn about wetland conservation programs currently available to them.

The future of wetlands in the Helena area is in our hands. We will be able to make better decisions about our future when we understand more about the natural resources in our community. With wise planning, conservation of our wetlands can accompany smart growth and development.

For More Information

If you would like more information on this exciting community project please call:

Pam Hackley, Soil Scientist, 449-0424
or
Susan Lenard, Montana Audubon, 443-3949.

A Landowners' Guide to Montana Wetlands

333.95288
WETLAND
BOOKLET
2001

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Cover photo, yellow bladderwort "utricularia vulgaris" Judy McCarthy

OFFICE OF THE GOVERNOR
STATE OF MONTANA

MARC RACICOT
GOVERNOR

STATE CAPITOL
HELENA, MONTANA 59620-0801

August 12, 1998

Dear Landowner:

As we all know, the attitude of human kind about wetlands is changing. Once considered wastelands, the federal government encouraged and supported landowners to drain and fill wetlands. Now, we recognize their value to provide flood control, ground water recharge, retain and recycle chemical pollutants and sediments and provide habitat for fish and wildlife. Additional wetland loss so concerned the National Governors' Association that its members unanimously endorsed a policy to halt the loss of wetlands and promote long term net gain of wetlands nationwide. Montana's wetlands are mainly on private land. So to protect them, we all need to work together.

I introduce, with pride, the land stewards described in this wetlands booklet. They have demonstrated their commitment to a healthy environment by sustaining wetlands while maintaining economically viable farms, ranches and developments. In many cases, wetlands protection has meant increased land values.

This booklet also describes many voluntary programs to restore, conserve and protect wetlands. I hope that our mutual commitments to both a healthy environment and the maintenance of private property values will prompt many of you to participate in these voluntary partnerships. By all working together, we can better protect this special corner of God's good earth.

Sincerely,

MARC RACICOT
Governor

TELEPHONE: (406) 444-3111 FAX: (406) 444-5529

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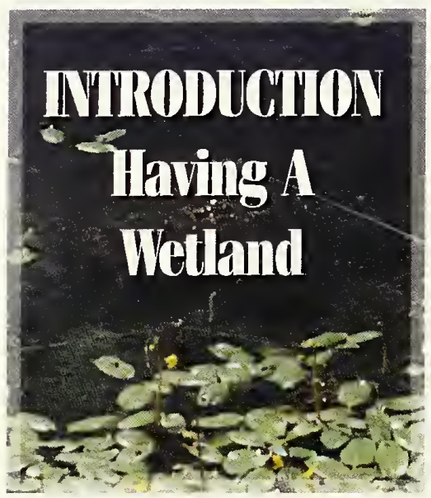
1515 EAST 6th AVENUE
PO BOX 201800
HELENA, MT 59620-1800

MAR 2 9 2001

FOREWORD

The purpose of this guide is to provide information for Montana landowners' informed use and management of their wetlands, bringing to life options for wetland protection, enhancement, and restoration. Simplified charts are provided to help private landowners pursue the options for themselves, by identifying and accessing the wealth of technical and financial assistance available for wetlands. And finally, for those bewildered by current wetland laws and regulations, the guide offers simple guidance.



Agriculture, ranching, recreation, and wildlife habitat are all important land uses in Montana, and they often occur on or impact wetlands, lands where water is the dominant factor determining soil, plant and animal development. These impacts raise difficult questions on both large and small acreage operations all across the state: How can we balance the needs of property owners to farm, ranch, or build on their land while maintaining the beneficial functions of natural wetlands? How can we respect individual property rights and assure that traditional land uses continue while conserving both privately and publicly owned wetlands? Answers to these questions depend on landowners' understanding the many functions of wetlands and how our land-use choices affect these valuable resources.

This guide provides a tool to help landowners use and manage wetlands. In this guide, you'll find:

SECTION 1—WHAT ARE WETLANDS answers some of your questions about wetlands, their value, and their function

SECTION 2—WORKING WITH WETLANDS presents a variety of ways that Montanans manage their wetlands and reap the rewards of conserving wetlands with the help of government and other programs and through traditional land management practices

SECTION 3—GETTING HELP: WHO, WHAT AND WHERE contains charts to help you locate the wide variety of wetland-related programs and services available in Montana

SECTION 4—WETLAND LAWS, PERMITS AND REGULATIONS describes current legislation and regulations, and provides time-saving charts to help you navigate the maze of federal, state and tribal laws governing Montana wetlands

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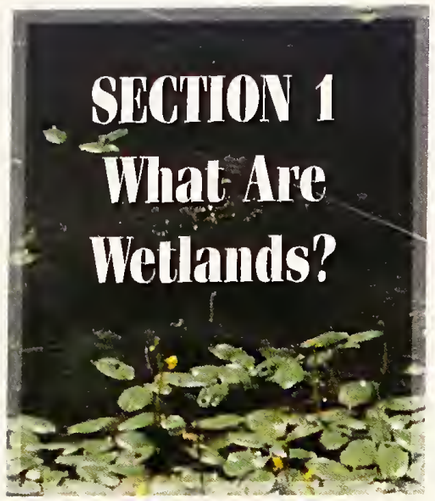
Pete Husby



SECTION 1 What Are Wetlands?

Do You Think You May Have A Wetland?

- Wetland hydrology: water at or near the land surface, all or part of the year

Do you have a place on your land where you watch ducks? Or where your tractor seems to always get stuck? Chances are you have a wetland. Montana's wetlands include marshes, fens, wet meadows, riparian areas along rivers and streams, prairie potholes, and spring seeps. In a wetland, water is often on or near the surface all or part of the year; the soil is poorly drained and may smell like rotten eggs and look gray; and water-tolerant plants such as cottonwoods, willows, cattails, rushes, and sedges may be present.

Pete Husby photos

- Hydric soils: soils that are poorly drained and develop certain soil characteristics due to the presence of water and absence of oxygen

What Do You Look For?

Identifying wetlands can be challenging. Generally, three attributes are present:

Ute Ladies Tresses, Spiranthus diluvialis

- Hydrophytes: vegetation adapted to life in wet soils

How Can You Be Sure That You Have A Wetland?

Temporarily flooded pothole wetlands fill in the spring...

Ducks Unlimited, Inc. photos

and then slowly dry up during the summer months.

By fall, the wetland may no longer be wet.

Wetlands aren't always wet

As you can see in the three pictures at left, the amount of moisture in a wetland can vary during the year. During some seasons, a wetland may actually be dry.

Terry Lonner

Shallow wetlands like this one provide valuable habitat for breeding birds.

If you think your land contains a wetland, ask a wetland specialist. Wetland specialists have training in vegetation, soils and hydrology. Some wetland specialists work for agencies like the Natural Resources Conservation Service (NRCS) and the Army Corps of Engineers (ACOE) and others are private consultants. Be sure to accompany this person so that you can ask questions and understand exactly where the wetland is and what its characteristics are. The specialist can also give you the names of people you need to contact about projects that might affect the wetland. Most land management practices, building projects, and other actions that occur in or near wetlands require state and/or federal permits; information on these permits and the agencies that issue them is in Sections Three and Four.

What Kinds Of Wetlands Occur In Montana?

- Riverine wetlands are associated with flowing water of rivers and streams. Examples: sloughs, abandoned meanders, and river and creek margins.

- Depressional wetlands are low spots on the landscape. Examples: glacial and prairie potholes, saline basins, wet meadows, and ephemeral ponds.

- Lacustrine fringe wetlands are associated with lakes or deep water habitats. Examples: margins around mud flats, lakes, reservoirs and ponds.

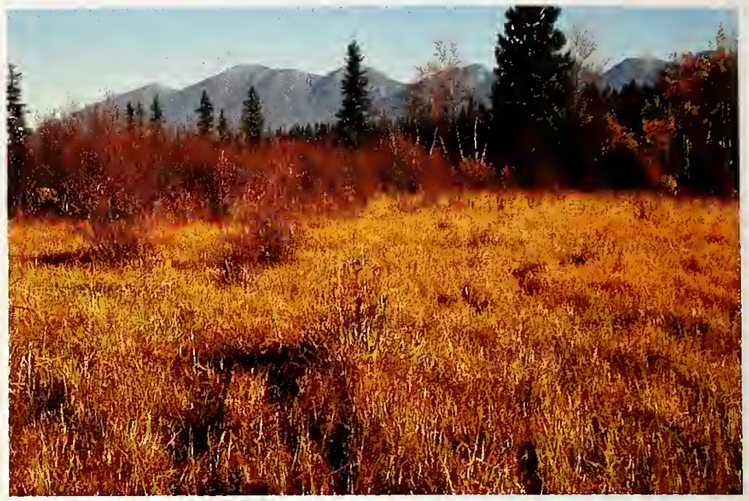
- Slope wetlands are groundwater discharge areas on a topographic gradient. Examples: sloping wet meadows, subalpine and montane areas of higher elevation, fens, springs and seeps.

- Artificial wetlands are created by human-related activities. Examples: seeps along irrigation canals.

Riverine wetlands

Depressional wetlands

Lacustrine fringe



Slope wetlands

Artificial wetlands

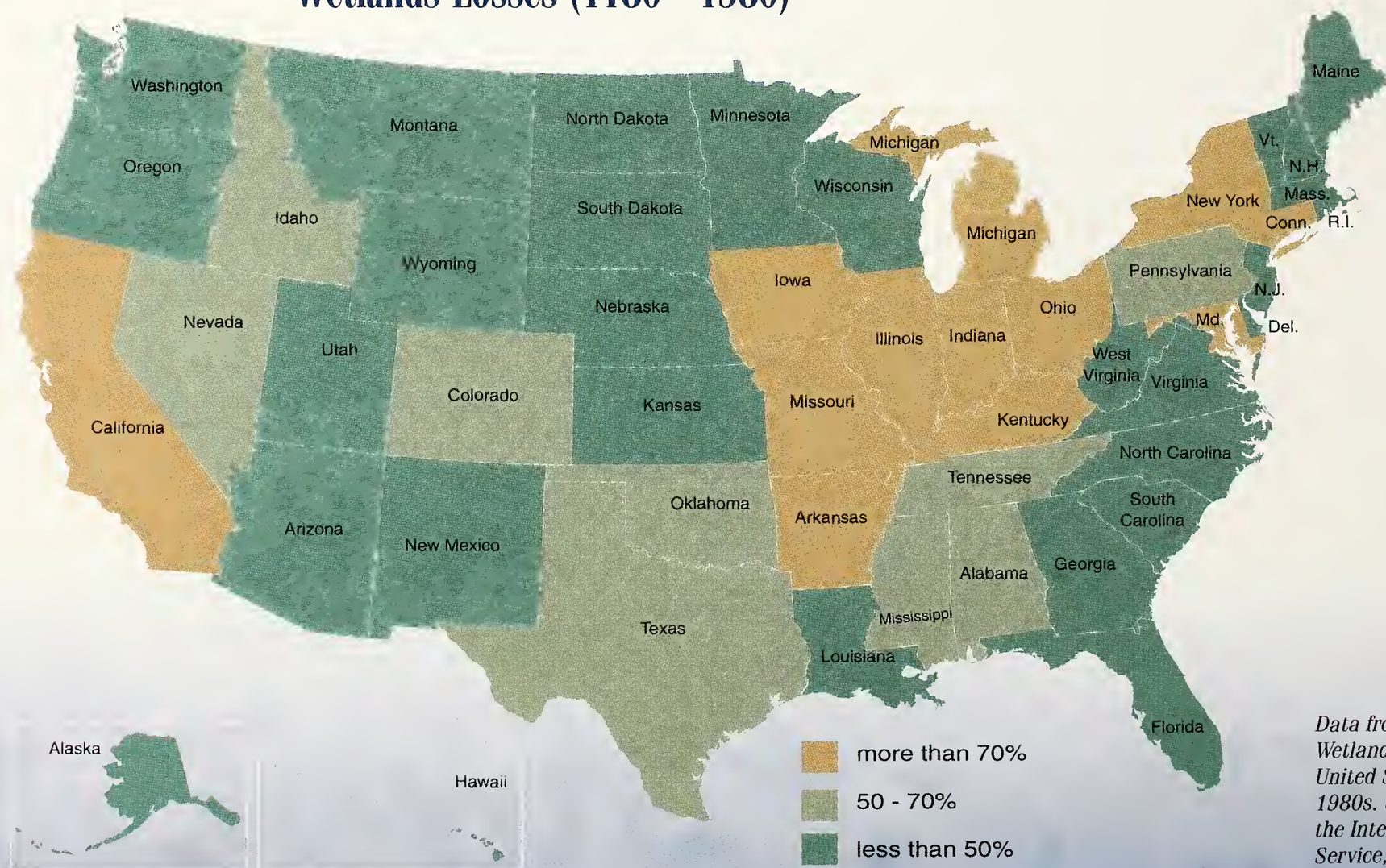
Pete Husby photos

Montana Wetlands: Are They Wastelands Or Valuable Resources?

Montanans' understanding and management of their wetlands has been dynamic and has evolved over time. For many years, wetlands were considered wastelands by farmers, developers, city officials and the general public because the land was too wet to plant crops or construct buildings on them. The federal government even encouraged the conversion of wetlands to dry land by granting subsidies to fill and drain them. As a result of all this activity, wetlands were lost in every state. It is estimated that about one-fourth of Montana's wetlands were lost because of agriculture and urbanization.

Today, however, we know wetlands are an important natural resource for waterfowl and other wildlife habitat, and for maintaining water quality. Federal and state governments provide technical assistance and some funding to protect remaining wetlands and restore lost or degraded wetlands.

Wetlands Losses (1780 - 1980)



Data from: Dahl, T.E. 1990. Wetlands Losses in the United States: 1780s to 1980s. US Department of the Interior, Fish & Wildlife Service, Washington D.C.

Jim Stutzman

A wetland is like a sponge

Soil acts like a sponge to absorb water entering the wetland and releasing it slowly. Soil, together with plants growing in it, also acts like a filter to trap pollutants in the water. As a result, water leaves the wetland cleaner than when it entered.

The sponge action of wetlands helps control flooding by retaining high water flows for later release. Flood irrigation—literally, flooding a field—acts much the same way, and is a common practice in parts of Montana. In the Beaverhead area, the Tash family applies this principle as a management practice throughout the growing season.

Bill Tash: Reflections From An "Old Flood-Irrigator's Perspective"

One of the most important aspects of managing waters in headwater states such as Montana is to demonstrate the advantage of historical practices such as flood irrigation. With only 88 frost-free days at over 6,000 feet elevations, such as the Big Hole Basin and the Centennial Valley, the only feasible crop that can be raised is native grass hay to supplement livestock feed needs in the long winters and to irrigate the valley meadows for aftermath grazing.

These century-old ranch operations, many of them in the same families since they were homesteaded, are classic examples of what good land and resource stewardship can and has accomplished. These ranchers have learned (sometimes the hard way) the most cost-effective ways to conduct their businesses and to stay in such a demanding business.

The high mountain valleys of southwestern Montana have been described as giant sponges that have the capability to store flood water runoff when the snow banks melt, especially when these flood waters are controlled and beneficially used for irrigation.

Other beneficial uses must also be recognized from this practice of "banking" the waters at these upper reaches of our river systems. Soil reservoirs are among the few affordable options we have left to allow water to "trickle-down" in a controlled release to sustain instream flows, especially for late season needs.

Flood control very certainly must be recognized as an important result of these historical practices. Flood run-off without effective controls can, and too often does, have a cumulative adverse effect on down river segments.

From this old flood irrigator's perspective; you can't make water run uphill, but you can spread it around as it goes the other way.

Bill Tash

Why Are Wetlands Important?

For many years, we were unaware of the important functions of wetlands. As our knowledge of these functions increased, we have come to understand the role that careful management plays in keeping natural wetland systems in balance. Montana's remaining wetlands provide services essential to our state's wildlife, water quality, and flood control. A healthy wetland can:

- Soak up large volumes of water and gradually release it to adjacent streams or water bodies during low flow periods of the year
- Recharge wells and aquifers by holding water long enough to allow the water to percolate into underlying soil, which replenishes groundwater supplies
- Support vegetation that acts as a flood buffer and stabilizes the shoreline
- Enhance water quality by holding sediments and toxins
- Naturally purify water by absorbing nutrients such as nitrogen
- Decompose organic matter and incorporate nutrients back into the food chain
- Provide habitat (food, water, shelter, and space) for millions of ducks, geese, shorebirds, and swans
- Provide habitat for numerous bird, mammal, reptile, and amphibian species
- Provide shallow water for freshwater fish to spawn, shelter and feed
- Protect habitat for threatened and endangered species. In Montana, 39 percent of endangered species are found in or are dependent on wetlands.

Pete Husby

Pete Husby

Pete Husby

Marcia Rueter Leritz

Pete Husby

Pete Husby

How Do Wetlands Benefit Ranchers And Farmers?

In the arid west, the availability of water directly affects the value of land—especially for those whose livelihoods depend on agricultural production. Wetlands are a source of water that is often overlooked. Wetlands benefit farms and ranches because they:

- Maintain late summer stream flows, which are critical for irrigating crops, watering stock, sustaining fisheries and recharging aquifers
- Maintain a higher water table than non-wetland areas, which increases subsurface irrigation and production of forage
- Filter sediment, which protects the quality of water, prolongs the life of irrigation pumps, and reduces siltation of ponds and irrigation ditches
- Reduce velocity of flood waters and bank erosion, which minimizes property losses
- Filter out chemicals applied to the land, such as nitrogen, phosphorus, and pesticides, which helps keep these elements from entering nearby lakes, streams or ground water
- Provide shrubs and trees that shelter livestock.

Marcia Leritz photos

Although these wetland functions benefit farms and ranches, some of these benefits also apply to *everyone* who lives in Montana. Additional wetlands benefits include:

- Recreational opportunities such as hiking, fishing, hunting, and wildlife viewing
- Revenues from fishing, big game, waterfowl, and upland game bird licenses and activities
- Educational opportunities to develop knowledge and skills in nature study
- Wastewater treatment—a few small communities have constructed wetlands for this purpose.

Can Livestock Enhance Wetlands?

Can livestock, under some circumstances, enhance wetlands for waterfowl production? Research has shown that livestock may be used to help control unwanted plants. For example, reed canarygrass is taking over ungrazed wetlands, diminishing the diversity of the wetland plant community, and making these areas unfit for breeding ducks. Wendy Williams, of the Natural Resources Conservation Service (NRCS), suggests that it may be possible for stockgrowers to suppress this unwanted plant by grazing livestock at critical times, such as when the canarygrass is immature, before rhizome development. Light to moderate grazing in the spring and fall may thereby create preferred brood habitat for breeding ducks. If you think your wetland may have problems with invasive plants, you may want to get help and experiment. Many questions about wetlands are yet to be solved by observant managers.

Wetlands Have Benefits And Drawbacks

Benefits	Drawbacks
Provides subirrigation	Cost to landowners of unusable land
Attracts wildlife, which enhances educational and recreational value	Attracts wildlife, which may bring unwanted side effects such as grazing on ornamental plants
Provides flood protection due to sponge effect of wetland	Creates mosquito breeding area
Supports vegetation that acts as a flood buffer and stabilizes the shoreline	Restored wetland may become subject to jurisdictional protection
May increase property values or provide additional income	Wetland projects may require water rights
Enhances water quality by holding sediments and toxins	Elevated water levels can adversely affect septic systems

Dennis Glick, Greater Yellowstone Coalition

Any Tax Relief In Sight?

Concerns about property value and tax relief are shared by landowners, and have been recognized by lawmakers. At the federal level, for example, Senator Daschle of South Dakota introduced wetlands restoration and conservation legislation (S. 1907) before Congress in April of 1998. If passed, this legislation would provide a refundable tax credit to farmers for the restoration and conservation of wetlands. Daschle cited the extraordinary value that wetlands can provide as habitat for plants and waterfowl, as a filter for water, and as a buffer against flooding. He also recognized the frustration that wetlands may generate when the field can't be efficiently tilled or planted. He called on Congress to provide a more comprehensive set of incentives than now exists to restore degraded wetlands and to ensure their long-term protection. His bill would also create a tax credit for owners of wetlands, farmed wetlands, and prior-converted crop lands. At least 20 states currently offer some form of property tax relief for landowners who preserve and protect wetlands on their private property. However, currently there is no property tax relief program for wetlands in Montana. This is something that private landowners and the Montana Wetlands Council could investigate.

What Happens If We Interfere With Wetlands?

When wetlands are destroyed, their loss can create far-reaching impacts:

- Decline in wildlife populations
- Increased flood damage
- Increased sediment and nutrients in lakes and streams
- Contaminated drinking water and irrigation wells
- Reduced fish productivity due to poor water quality and habitat loss
- Increased costs of treating drinking water
- Reduced recreational opportunities and loss of tourist dollars
- Lower water tables
- Reduced production of livestock

Because wetlands destruction can have such far-reaching impacts, alterations to wetlands need to be reviewed by the appropriate agencies. (See Sections Three and Four.) One Montana landowner learned this lesson the hard way. He unknowingly began to build a house and pond in a wetland without first learning about wetlands protection laws and necessary permits. (Sometimes pond building can be beneficial; see Section Two.) After much hard work, he had to comply with the law and reclaim lost ground with the help of an environmental engineering company.

Before

- Stripped entire streamside (riparian) area of vegetation and topsoil during construction of a residential building pad, driveway, and recreational pond
- Constructed pond (right) in the central portion of the wetland
- Constructed building pad over a portion of the wetland using material excavated for the pond
- Piled cottonwood trees and stumps near the stream bank and burned them, which created the threat of ash and sediment washing into the stream and impacting water quality

After

- Removed downed trees, ash, and other debris from the flood plain
- Removed granular soil that was overlying the former ground surface on the flood plain
- Returned the area to the approximate grade before construction began
- Backfilled pond with similar granular soil
- Reconstructed an irrigation ditch that had flowed across the site before excavation activities
- Re-established vegetation, including native wetland species, on the flood plain
- Constructed erosion control features along the south and east sides of the building pad, and reconstructed the slopes of the building pad
- Reduced sediment erosion during spring floods by leaving boulders, cobbles and woody debris on the ground surface of the disturbed area

September 1996, after landowner's uninformed actions, but before reclamation

September 1997, after reclamation work was completed

Paul Burley photos

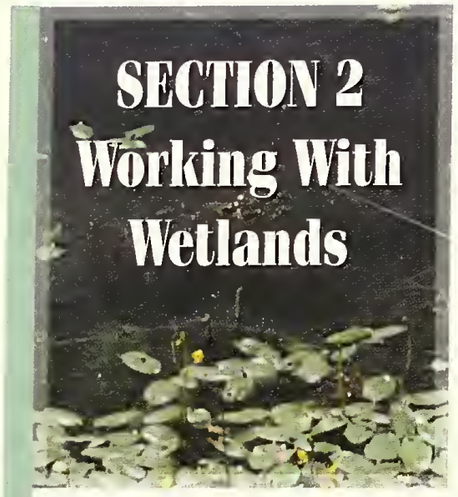
Do Wetlands Affect Human Health?

Human health is directly associated with wetlands because we all need clean water. Wetlands break down and hold nutrients, chemical pesticides, salts, sediments, and organic wastes. The pollutants can enter our water through runoff from sources such as city streets, lawns, construction sites, mining operations, and agricultural fields. In times of normal flow, wetlands act like a giant sponge and filter to reduce the amount of these elements entering lakes, streams and, ultimately, your drinking water!

Montana Watercourse photos

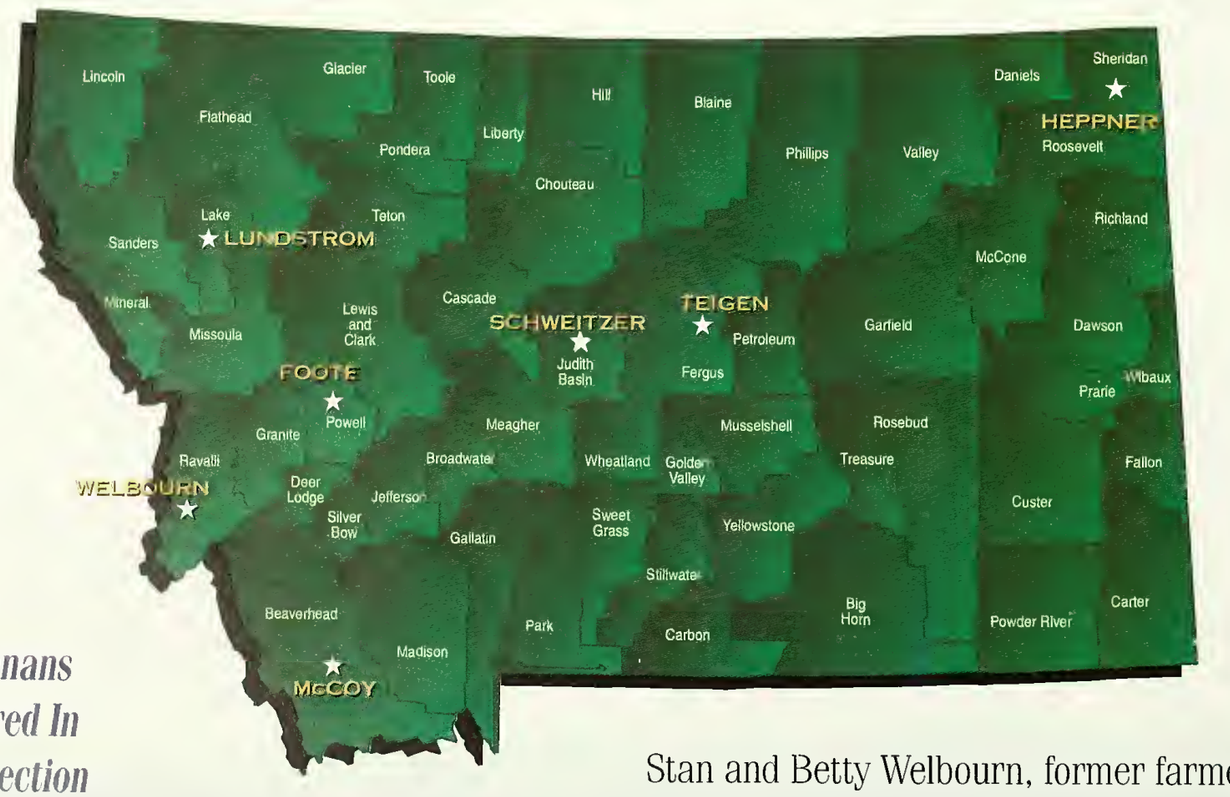
The Montana State Constitution guarantees a healthy environment for its citizens. Shared responsibility for protection and improvement of Montana's water is found in Section One of Article IX and says, "The state and each person shall maintain and improve a clean and healthful environment in Montana for present and future generations."

As you consider your wetland, read on to meet some of the folks who have restored and/or protected their wetlands.



SECTION 2 Working With Wetlands

In this section, you'll meet farmers and ranchers who live and work in many parts of Montana. On both large and small operations, they show the various ways that Montana landowners can manage wetlands. The Teigen family—the first example—shows that wetlands conservation has been around since homesteading days. The other people in the examples share their experience with the wetlands programs and technical assistance available from state and federal agencies.



Montanans Featured In This Section

Teigen Family, ranchers ; Petroleum/Fergus Counties

Bill Lundstrom, Shooting Preserve Manager; Lake County

Lawrence and Mary Lou Heppner, farmers; Sheridan County

Stan and Betty Welbourn, former farmers; Ravalli County

Larry and Kathy Schweitzer, landscapers; Judith Basin County

Poncho and Beverly McCoy, ranchers; Beaverhead County:

Geof and Cathie Foote, ranchers; Powell County

Meet Dan Teigen

A Century Of Ranching And Caring For Wetlands

Dan Teigen tells how his family continues the management practices of his forebears:

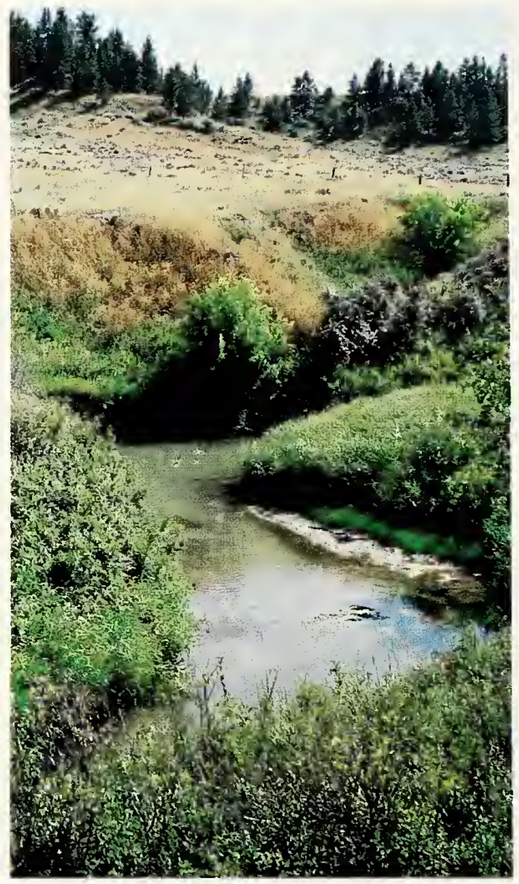
The Teigen family has been ranching in central Montana since 1884 when three cousins from Norway drove three bands of sheep northeast from Bozeman in search of good water and open grass. They homesteaded before barbed wire in the area between Grassrange and Winnet. Today, the central portion of the ranch straddles Highway 200 and McDonald creek for about 13 miles, with the creek meanderings easily tripling that distance. The ranch also stretches along parts of Elk Creek to the south, Ford Creek to the north, near War Horse National Wildlife Refuge, as well as additional summer pasture near Cat Creek to

the northeast. Originally, sheep bought and paid for the place, but cattle have long since been paying the bills.

One isn't likely to hear the word "wetlands" spoken around the ranch, but wetlands are something you're likely to see. We practice a hands-off hooves-on approach to wetland management. Our main focus is caring for our cattle, which has us indirectly caring for our wetlands.

Our cattle are on the creek primarily during winter months, when frozen soil and creek banks are more tolerant of hoof impaction than during warmer months. The cattle go out into the hills to summer pastures as soon as possible in the spring, allowing for hay to be cut on the creek bottoms over the summer. By running a conservative cow-to-land ratio, we can trust that the cattle won't abuse their pastures, so we don't need to fence off areas or monitor excessively.

We develop stock water resources to better utilize grass all throughout pastures, using offsite water (wells, tanks, and reservoirs) wherever possible. Even when cattle can reach creek water in winter, we prefer them drinking from offsite water because it's warmer. When a cow drinks cold creek water, she's got to eat extra hay to warm up again. Only then can she give all the necessary attention needed by her calf. That's a subtle but important area which can help to produce better performing cattle.



Cleaner offsite water sources in the summer also give us a better performance from cattle than if they are always slurping up muddy creek water. A higher yielding cattle herd can pay for its own improved water sources in the long run. And, we believe that the long run is the only way to be in ranching.

Dan Teigen photos

We like the thick brush along the creek for shelter in the winter. The more warmth our cattle get from thick growth in our creek bottoms, the less warmth we need to provide them in the form of food. If cattle are out in the open in a harsh winter, we have to feed them proportionally more to keep their "internal combustion engines" running. During calving, the cows head right for the shelter and privacy of thick brush and trees along the creek bottoms.

We also like the fact that the lush vegetation along the creeks acts as a sponge to help minimize spring flooding and prolongs runoff into the dry season. By not farming right up to the edge of the creek, we leave filter strips to help keep runoff water clean and prevent our soil from ending up in the Gulf of Mexico. Finally, if abundance and diversity of wildlife are any indication of a well balanced ecology, then we must be doing something right.

Dan Teigen, Teigen Family
Teigen Land and Livestock Company
Teigen, MT 59084
(406) 428-2105

Meet Bill Lundstrom

From Rancher To Waterfowl Manager

Bill Lundstrom
Shooting Preserve Manager
3410 Robertson Road
Ronan, MT 59864
(406) 676-2044

Bill Lundstrom owns a 280-acre ranch in the Mission Valley, halfway between Nine Pipe National Wildlife Refuge and Pablo National Wildlife Refuge on the Flathead Indian Reservation. He has always enjoyed raising birds and felt that his land was better suited to waterfowl than cattle ranching, which was barely getting him by. He wanted to improve the waterfowl habitat and start a hunting club business, so he searched for assistance. One contact finally led to another and six years of collaboration with federal agencies has paid off for Mr. Lundstrom. He has restored 42 acres of wetland, set aside 160 acres of grassland in a conservation program and signed a perpetual conservation easement on his entire 280 acres. Acquisition of funding and technical expertise have enabled Mr. Lundstrom to earn a better income through the hunting club business, to maintain his land, and to continue to live on it while feeling that he's doing something for wildlife.

"More information needs to be out there because farmers and ranchers are in a financial bind. Any help the various agencies give will go a long way toward helping them to preserve wildlife on their lands."

The Lundstrom property before restoration began.

An enhanced wetland area after restoration.

Greg Nydecker photos

Actions

- Created three new ponds and enhanced eight others
- Established a five-acre wetland surrounded by a ten-acre fenced area to restrict cattle from stream
- Constructed an outlet structure from a nearby irrigation ditch to provide water for the wetland
- Restored an additional 37 acres of wetlands
- Conserved 160 acres of grassland surrounding the wetlands
- Signed perpetual conservation easement on 280 acres with the US Fish and Wildlife Service (USFWS)
- Provides continual monitoring of wildlife and water level management on the restored wetlands

Who Helped?

In 1991 and 1995, respectively, Greg Nydecker and Dean Vaughan of the USFWS assisted with wetland restoration and the conservation easement. Pheasants Forever, especially John Noel, supported the fencing project surrounding the wetlands. The Montana Department of Fish, Wildlife and Parks helped Mr. Lundstrom with an agreement to set aside 160 acres of grassland for a year until 1993, when he was accepted into the former Waterbank Program. Various agencies contributed about $10,000 total. Although the Waterbank Program is no longer accepting new contracts, it is maintaining current contracts such as Mr. Lundstrom's. He receives $3,700 per year until the year 2002.

Permits Required

Federal 404

Confederated Salish and Kootenai Tribal permit

Benefits and Rewards

- Restoration projects have enabled the owner to continue to maintain and live on the land
- $3,700 annual income is provided by setting aside the grassland
- Wetland restoration enhances wildlife habitat
- Owner now participates in multi-year ground nesting bird survey by University of Montana researchers

Advice

"When the information on how to proceed with wetland restoration is ready, it needs to be available to people. It would have helped me a lot to have had something like that in hand when I began searching."

-Bill Lundstrom

A restored wetland on the Lundstrom property.

Aerial view of Lundstrom's property in the Flathead.

Greg Nydecker photos

Meet the Heppners

From Farming to Conserving the Sloughs

Lawrence and Mary Lou Heppner
Westby, MT 59275
(406) 385-2550

Mr. and Mrs. Heppner own a farm in Sheridan County in the prairie pothole region of northeast Montana. Their wetlands are sloughs that are wet in some years and not so wet in other years. Instead of trying to grow crops in the sloughs, they now maintain the acreage as wetlands under the Conservation Reserve Program (CRP). In addition, they restored 750 acres of wetlands with the help of CRP. They allow some grazing on the land in the program, but restrict livestock use around the streams by fencing off the vegetation buffer areas.

Actions

- Designated 100 acres of cropland into the USDA water bank program
- Assigned 750 acres into the Conservation Reserve Program
- Seeded 750 acres of former cropland back to grass to stabilize the soil
- Fenced stream areas to limit livestock damage

Who Helped?

In 1977, the Heppners signed up with the Soil Conservation Service (now the NRCS) for the Waterbank Program; they are now completing a second ten-year contract under the Conservation Reserve Program (CRP). In 1990, they worked with Charles Gephardt at the NRCS to seed 750 acres of former cropland as another part of the CRP. The cost-share for the grass seed and seeding was divided about evenly between the CRP and the Heppners. The CRP paid $10 per acre for grass seed and seeding on both plots. Fencing material to keep livestock off the river banks was at the Heppner's expense and amounted to about $2000.

Permits Required

No permits were required.

Benefits and Rewards

- Landowners enjoy more visible wildlife such as birds, deer, and coyotes
- Land in CRP provides annual income to support farming lifestyle
- Land is available for growing hay or grazing livestock, with adjusted payments
- Landowners retain full use of land with no open hunting or fishing privileges

Jim Stutzman

Lawrence Heppner

Advice

"It's good to use the CRP program because the NRCS promotes the use of native seed. This way the land can get back to the way it first was. It's hilly here and light gravelly land. I like to see it go back to the way it was long ago."

-Lawrence Heppner

Meet the Welbourns

Managing The Wetland By Revegetating The Stream

Stan and Betty Welbourn
Retired Farmers
P.O. Box 2106
Hamilton, MT 59840
(406) 961-4522

Stan and Betty Welbourn retired from their large farm operation in 1988 and now irrigate alfalfa and hay on their 40-acre property. Mill Creek crosses their land and had eroded its bank, which increased sedimentation and cut into the associated wetland. The wetland is critical for wildlife, which use the vegetation and stream corridors for protective cover and transport. The Welbourns consulted the NRCS in Hamilton and found that their stream and wetland problem could be assisted by the Wetlands Reserve Program. According to Lane Johnson at the Hamilton NRCS field office, they restored the stream because its lateral movement was drying up the associated five feet of valuable wetland on either side.

Actions

- Moved stream bank with assistance into the stream 10-20 feet to create new stream banks
- Stabilized banks with tree root wads, logs, boulders, and sod
- Connected channel widths and stabilized stream gradient with rock and log structures along the banks and at the downstream end of the meanders
- Revegetated the stream bank with shrubs

Who Helped?

The project was done under the Wetlands Reserve Program (WRP) with a cost-share agreement of 75% WRP and 25% landowner. The average cost came to about $23 per foot of treated stream bank. Gary Decker of Westwater Consultants, Inc., Pat Vaughan of the Hamilton office of the US Department of Agriculture, and Dean Vaughan of US Fish and Wildlife Service assisted the Welbourns in the project.

Permits Required

Federal 404 State 310

Benefits and Rewards

- Stabilized and revegetated stream bank has improved wildlife habitat
- Increased stream flow improved fish habitat
- Raised streambed restored wetland acres and reduced sedimentation in the stream
- Stabilized bank protects against future erosion
- The stream and wetland are aesthetically more pleasing

Streambank erosion along Mill Creek

Lane Johnson photos

Moving streambanks 10-20' into the stream

Bank stabilization with tree root wads, logs and boulders

Advice

"Have a tentative plan to present so that the NRCS personnel have, in hand, a design that they can review for approval. It is important to work closely with the NRCS in the initial stages. Most likely they will be familiar with the low and high water stages of the project." -Stan Welbourn

Meet the Schweitzers

Landscaping To Enhance Wetland And Upland Habitats

Larry and Kathy Schweitzer
Landscapers
RR3 Box 3134
Lewistown, Montana 59457
(406) 538-6668

The Schweitzers produce hay and alfalfa on a 400-acre site that runs along Warm Springs Creek in Fergus County. Mr. Schweitzer envisioned this land as a very special place for wildlife and has grown food plots, built waterfowl nesting structures, and planted trees for cover. He has enhanced wetlands all along the floodplain of the creek and has done "tremendous wetland and riparian management," according to Ted Hawn of the Lewistown NRCS. Mr. Schweitzer feels pleased with the work he has accomplished in wildlife habitat enhancement. He also is pleased that some parts of the land have made a comeback just by being left alone. While that may be one method of land restoration, he also can't resist the urge to dig a pond or two, or to plant a tree, or a few thousand of them. So far, Mr. Schweitzer has planted 4000 trees in one shelterbelt, another 15,000 in a pasture and 28,000 on a 240-acre property.

Larry Schweitzer

Actions

- Developed and improved deer, pheasant and waterfowl habitat
- Planted food plots of corn, barley, oats and wheat in the wetland and uplands
- Installed goose nesting platforms along the creek
- Planted upland shelterbelts for cover and food
- Dug two ponds to enhance waterfowl use

Who Helped?

Pheasants Forever helped plant trees while Mr. Schweitzer planned the design of food plantings and shelterbelts. Bob Watts and the Upland Game Bird Habitat Improvement Program of the Montana Department of Fish, Wildlife and Parks helped plant shelterbelts and tall wheatgrass. Partnerships consisted of Schweitzer doing the work while trees were obtained through the state program, available through the Conservation District. Ted Hawn of NRCS worked with Mr. Schweitzer on the pond projects. The US Fish and Wildlife Service, assisted by Mike Gettman, has also been involved in pond building.

Permits Required

Federal 404 State 310

Benefits and Rewards

- Replenished the habitat from which he has hunted
- Increased numbers and diversity of wildlife, waterfowl, and upland birds
- Improved wildlife watching (seeing more deer, pheasants, fox and marsh hawks than before)
- Feeling that one person can make a positive difference in the landscape

Advice

"I keep learning about planting shelterbelts by trying new things. Know what to plant, native if possible, and then how to space the plants. To lessen wind action, plant shelterbelts on a contour. . . . Sometimes I wonder if I'm getting anywhere, but when I see a hen and brood of chicks run across the way, I know I'm on the right track."

-Larry Schweitzer

Judy McCarthy

Meet the McCoys

Improving Wetlands For Waterfowl And Calving

Poncho and Beverly McCoy
Cattle Ranchers
McCoy Cattle Company
5600 Highway 91 North
Dillon, MT 59725
(406) 683-2980

Poncho and Beverly McCoy, owners and workers on their cattle company in Beaverhead County, became concerned about the diminishing duck population in the late 1980s and decided to do something about it. They improved waterfowl habitat on their existing wetlands by developing six small ponds along a series of spring creeks. After nine years of hard work, monitoring, and trial and error, they are finally seeing an increase in waterfowl numbers. The McCoys feel a deep satisfaction in watching the geese return each year. They also model their wetlands for educational purposes to 4H Clubs and school children. In addition, they have found that their wetland restoration also provides a good place for their cows to calve.

"As a hunter and fisherman, I want to put back what I have enjoyed. It's very satisfying to have wetlands on the property; they make the whole landscape better."

Actions

- Built eight elevated culvert nesting structures
- Blocked streams to increase water surface
- Excavated gravel to flood more shallow areas for feed
- Installed culverts to raise the water level
- Reseeded wetlands with hay and orchard grass
- Maintained culverts, monitored sites, and adjusted strategy to enhance nesting
- Maintained warm spring creeks for spring nesting and fall migration

Who Helped?

Jeff Herbert of the Montana Department of Fish, Wildlife and Parks, through the Montana Waterfowl Stamp Program, provided the culverts, helped with the cost of excavation, and then returned to monitor the wildlife use. The Natural Resources Conservation Service, particularly Rich Nordquist, helped design the projects and provided technical assistance.

Permits Required

Federal 404 State 310

Benefits and Rewards

- Satisfaction in seeing wetlands habitat activity on the property
- Increased waterfowl use by both returning waterfowl and new breeding pairs
- Provides educational example for school children
- Reseeded wetland provides calving ground

Poncho McCoy

Advice

"Keep changing what you're doing if it's not working and learn as you go. Nesting structures have to provide a sense of safety for the waterfowl. In making land changes, sometimes the biggest challenge is what to do with the dirt you dig from a pond. We used some of the dirt and gravel to narrow and deepen the creek so fish could use it for spawning. Other dirt was used to fill and smooth nearby bumpy ground. The area was then seeded in tall wheatgrass, which now provides calving grounds for the cows." -Poncho McCoy

Meet the Footes

Ranching And Total Land Stewardship

Geof and Kathie Foote, Ranchers
Meadow Springs Ranch
Ovando, MT 59854
(406) 793-5720

Twenty-three years ago, Geof and Kathie Foote bought land with low rolling hills, glacial potholes, mixed pine, fir and spruce forests, grasslands and wetlands, all cut by a major spring-fed tributary to the Blackfoot River. However, agricultural use since 1890 had produced overgrazed grasslands, depleted woodlots and degraded streams. Geof and Kathie envisioned restoring the land to its natural communities and molded their lifestyle to fit these biological systems. The restoration was approached as an interconnected system of forest, grassland, wetland and stream. All aquatic and terrestrial life, including human residents, would be affected by any changes in this environment. With careful planning, the Footes' have achieved this renovation and secured it with a perpetual conservation easement on the land.

Sam Curtis

"We think about sustainability in land use and want to demonstrate this philosophy by our stewardship of the land and our lifestyle. Since the restoration of the forests, grassland, wetland and stream habitats, we have observed an increase in the diversity of predator-prey populations. This indicates to us a return to health of the natural systems. After four years of attempted nesting, a pair of bald eagles are raising young." -Geof and Kathie Foote

Actions

- Constructed fences to control grazing of grasslands and forest
- Harvested damaged trees by low-impact horse-logging in forest while selecting superior tree stock for future generations
- Built small dam to impound some of Dick Creek to provide constant water source for nesting marsh, hay irrigation and potential power generation
- Constructed passage for fish around the dam
- Fenced Dick Creek from domestic grazing and returned it to its natural stream channel
- Expanded spawning area of stream for fish reproduction
- Developed wetland with water level controls for breeding waterfowl
- Developed marsh filter system to filter domestic stock runoff
- Planted woody shrubs and grasses along stream bank for stabilization and shade to reduce water temperatures for fish habitat
- Placed woody debris along creek to provide cover for fish and aquatic life
- Built houses and platforms for nesting ducks, geese, upland birds and cavity-nesting mammals

Who Helped?

The US Fish and Wildlife Service (USFWS), especially Gary Sullivan, Greg Nydecker and Jim Stutzman, provided planning and technical assistance through its Partners for Fish and Wildlife program. Ducks Unlimited reimbursed the USFWS $10,000 of the $18,000 cost of the wetland restoration project. The Footes contributed their own equipment, labor, logs, sawmill, and funds. Restoring Dick Creek involved many groups to plan the extensive fish habitat/waterfowl breeding marsh and filter system. These groups included Partners for Fish and Wildlife, USFWS, MDFWP, National Fish and Wildlife Fund, the Blackfoot Chapter of Trout Unlimited, plus the NRCS.

Permits Required

Federal 404 State 310

Benefits and Rewards

- Increased hay production from 175 to 700 bales due to renewed water control and irrigation, which also greens up the fall pasture
- Increased numbers and diversity of natural communities of waterfowl, bald eagle, black tern, great gray owl, mountain lion, red fox, goshawk and merlin, elk and deer
- Increased spawning areas for fish
- Faster-growing woodlot due to selective removal of over-stocked trees, which were used for the dam structure
- Cleaner creek due to filtered water system that treats organic runoff from domestic stock
- Potential electricity source provided by dam

Advice

"If you restore a wetland with waterfowl breeding in mind, stabilization of the water levels during the nesting season is essential. Adding vegetative cover allows visual seclusion of nesting birds while islands provide predator protection." -Geof Foote

Widgeon Marsh before restoration

Widgeon Marsh after restoration

Jim Stutzman photos

Opportunity or Challenge?

In spite of all the positive examples on these pages, wetlands remain problematic for some Montana landowners. Why? One example may serve to illustrate. When John Q. Landowner applied for one type of federal farm program assistance, he gave permission to NRCS staff to come and examine his property. This led to a delineation of the wetlands on his land. Once the wetland areas were delineated, for John to qualify for the federal assistance, he had to agree to limitations on how his land would be used. John was not happy with this outcome and his wetlands, thereby, took on a negative light. This situation contrasts considerably with those shown on these pages, where landowners found enterprising ways to turn the "problem" of wetlands into an opportunity!

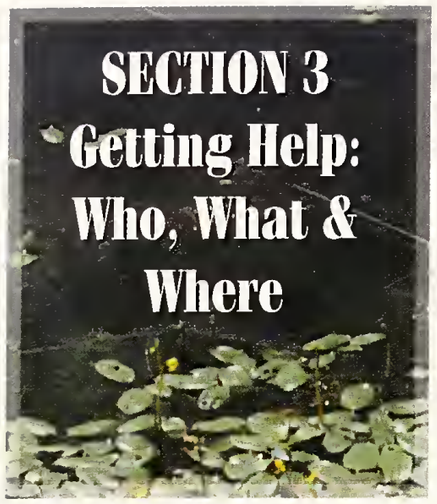
Wetland Restoration In Montana

Ever wonder how much wetland has been restored, enhanced, protected or created in Montana? While these figures are approximate, they do show gains that have been made by Montanans working together for wetlands conservation.

Jim Stutzman

Statistics show that the average annual net loss of wetlands is 117,000 acres nationwide. Due to increased awareness and restoration programs, this rate of loss has declined by 60 percent from the previous decade.

Program	Time Period	Acres	Cost
Challenge Cost Share	Since 1988	1,000	Not available
Conservation easements associated with WRP	3 years	About 23,000	$4,000,000
Ducks Unlimited	14 years	12,709	$8,900,000
Montana Migratory Game Bird Stamp Program	1 year	250	$200,000
Montana Land Reliance-Conservation Easements	Since 1978	4,904	Not available
Partners for Wildlife	2 years	1,800	$500,000
The Nature Conservancy-Easements	Since 1978	20,000	Not available
USFWS-Prairie Pothole Restoration	8 years	2,000	$250,000
BOR-Wetland Development Program	1 year	50	$10,000
WRP and CRP	3 years	8,000	$200,000



As the previous case studies show, many landowners recognize the benefits of wetlands on their land and want to restore or conserve them. Some landowners undertake restoration and protection projects at their own expense, other landowners participate in voluntary programs administered by public agencies and private organizations. In this section, you will find information about these agencies, organizations, and programs. They can help answer questions you might have, such as: How can I manage my wetlands for conservation? What are the advantages and disadvantages? What do I need to consider before starting a water retention or wildlife habitat project? How can I pay for it?

What's Right For Me?

If you are considering wetlands restoration or enhancement on your land, how do you decide what actions to take? You can determine several possible options by asking yourself four questions:

- Do you want to continue to own your wetland?
- Do you want to be the sole manager of the property?
- Do you want to be paid for the property?
- Do you want to regulate future use of the wetland after the property title is transferred?

Use the decision tree on page 26 as a starting point to explore your options, then refer to the charts that follow for more details.

Some Landowner Options

If you have a wetland on your property, you can choose from a wide range of options to restore and/or conserve the wetland. They range from retaining ownership to donating the land, and are described next.

Retain ownership and guide future use of the property. You can choose one or a combination of options:

1. *Conservation Easements* are a perpetual legal agreement between a private property owner and a qualified conservation organization, such as a land trust, to voluntarily place restrictions on the type and amount of development that may take place on a piece of property and to protect significant natural features including wildlife or wildlife habitat. Conservation easements allow the property owner to retain ownership of the wetland while potentially receiving income and estate tax reductions (see chart).

2. *Leases* are agreements for the rental of land by a landowner to a conservation organization or agency for a specified period of time. The landowner receives periodic payments for the leased property while the use and protection of the land are in the hands of the agency.

3. *Restoration* involves the active rehabilitation of a degraded wetland to recover its natural attributes, functions and values. You receive technical and financial assistance for restoration projects, and may gain economically from recreational and other benefits.

4. *Management Agreements* are worked out between a landowner and a conservation agency. Either the landowner or conservation agency agrees to maintain the property in a manner consistent with the goals of the conservation agency and the landowner.

5. *Limited Development Strategies* involve the sensitive development of the least environmentally significant portions of property to finance conservation of the remaining property and meet landowner's economic needs and goals.

6. *Remainder interests* transfer full or partial interest in a property to an appropriate grantee, such as a nonprofit conservation organization, after the death of a landowner. It may also affect any subsequent title holders whom the landowner names.

Sell the property.

You can sell land to a conservation organization at full market value, as a bargain sale (a price below full market value), an installment sale, or a right of first refusal.

Donate the land.

If you donate land (transfer of title without compensation) to a conservation organization (land trust), you ensure total protection for the wetland and that it will be maintained and enhanced.

Dean Vaughan

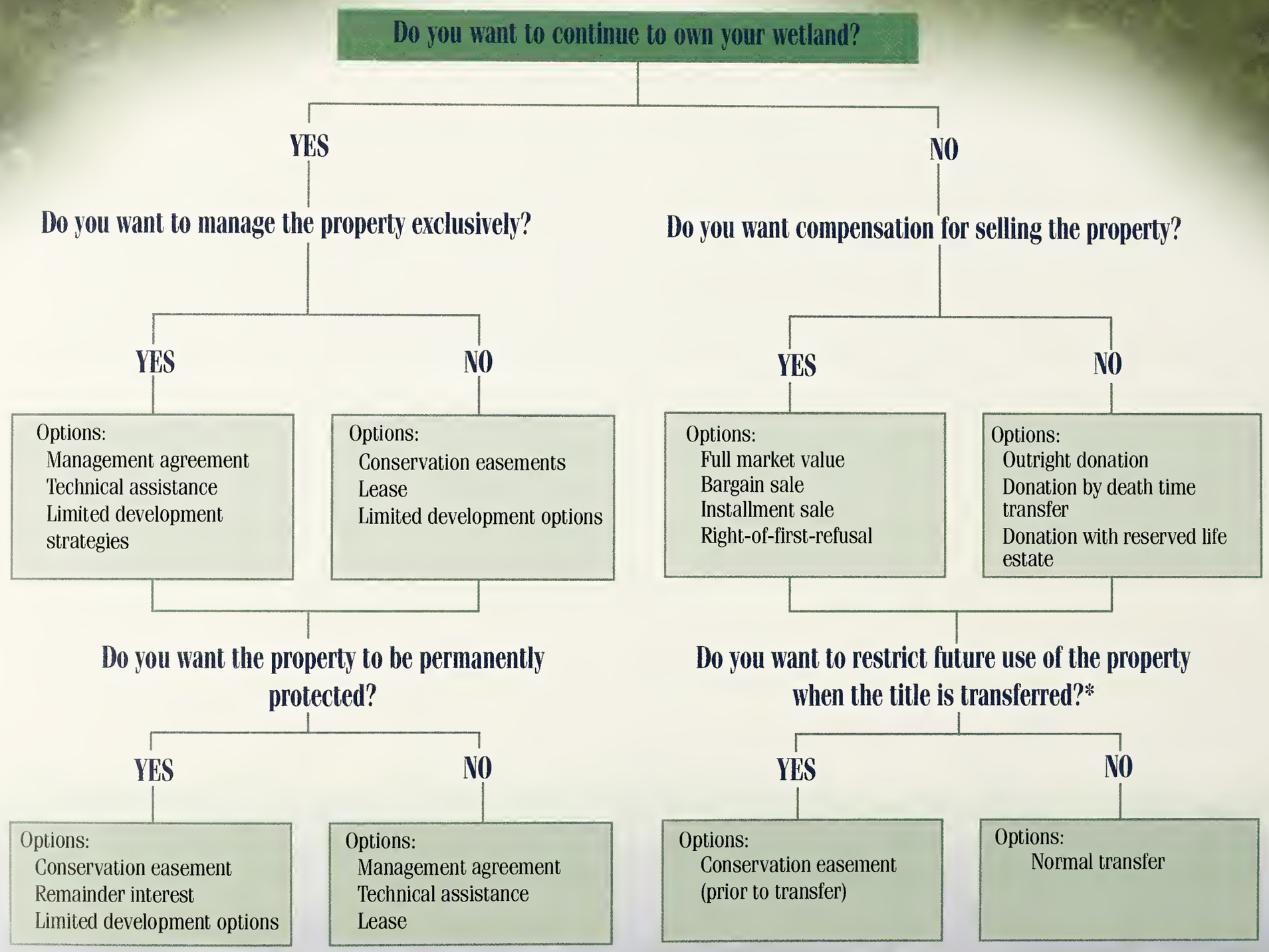
Where To Find Help

Do you have a wetland on your property? Do you want to restore a wetland? Are you thinking of creating a wetland? If so, help is close at hand. Experts at federal, state, tribal and local agencies, as well as private organizations, can provide the information you need—and they are only a phone call away. Consult the two charts that follow, "A Quick Reference Guide to Wetlands Programs," and "A Detailed Guide to Wetlands Assistance."

Montana Organizations That Handle Conservation Easements

Organization	Contact Person	Telephone/E-mail/Address
Five Valleys Land Trust	Wendy Ninteman	(406) 549-0755 P.O. Box 8953 Missoula, MT 59807
Flathead Land Trust	Susan How	(406) 752-8293 P.O. Box 1913 Kalispell, MT 59903
Gallatin Valley Land Trust	Debbie Deagen	(406) 587-8404 P.O. Box 7021 Bozeman, MT 59771
Montana Wetlands Trust (statewide)	Charles van Hook	(406) 442-3199/431-2098 517 Waukesha Helena, MT 59601
Montana Land Reliance (statewide)	Bill Long	(406) 443-7027 P.O. Box 355 Helena, MT 59624
Prickly Pear Land Trust	Jerry DeBacker	(406) 443-5705 debacker@mt.net 302 N. Last Chance Gulch Helena, MT 59601
Save Open Space	Janet Sproull	(406) 549-6083 Missoula, MT 59802
The Nature Conservancy (statewide)	Brian Martin Bernie Hall	(406) 443-0303 32 South Ewing Helena, MT 59601

Landowner Decision Tree



** If landowners wish to guide future use of the property through transfer, they should consider donating a conservation easement for the property to another organization before transferring the property in fee through a normal transfer (i./e., sale or donation). If landowners do not wish to restrict future use of the property, they can transfer the property through a normal transfer.*

A Quick Reference Guide To Wetlands Assistance*

Program	Eligible Lands	Assistance	Sponsor	Contact	Address
Challenge Cost-Share Program	Wetlands on public lands	Financial	USDI, BLM	Bob Haburchak	(406) 255-2798 Billings
Conservation Reserve Program CRP	Wetlands	Financial	USDA, FSA	Dave Heilig	(406) 587-6789 dheilig@mt.nrcs.usda.gov Bozeman
Debt For Nature (Conservation Contract Program)	Highly erodible lands, wetlands, and special kinds of habitat that may support particular wildlife	Financial	USDA USDA FSA	Dave Heilig Roger Meredith Mel Yost	(406) 587-6789 dheilig@mt.nrcs.usda.gov Bozeman (406) 687-6786 (406) 587-6799
Emergency Watershed Program	Wetlands	Financial, technical	USDA, NRCS	D. James Suit	(406) 587-6822 jims@mt.nrcs.usda.gov Bozeman
EQIP	Wetlands-farm and ranch lands	Technical, financial, educational	USDA	Dennis Loreth	(406) 587-6795 dloreth@mt.nrcs.usda.gov Bozeman
Farmland Protection Program	Wetlands-farmland	Financial	USDA, NRCS	Dave Heilig	(406) 587-6789 dheilig@mt.nrcs.usda. gov Bozeman
FSP/SIP	Wetlands	Technical, financial	USDA, NRCS	Robert Logar	(406) 587-6836 bob@mtso9.mt.nrcs.usda.gov Bozeman
Intermountain Riparian/ Wetland Resource Technical Team	Wetlands, forest lands	Financial, technical	USDA, NRCS	Sandra Wyman Marcus Miller Chris Noble Terry Costner	(406) 587-6924 swyman@mt.nrcs.usda.gov Bozeman
MARSH	Wetlands	Financial	Ducks Unlimited	Steve Bayless	(406) 458-5794 mrshcrkfrm@aol.com Helena
Montana Migratory Game Bird Stamp Program	Wetlands	Financial	MDFWP	Jeff Herbert	(406) 444-2612 jherbert@mt.gov Helena
NAWMP/NAWCA	Wetlands	Financial	USFWS	Jim Stutzman	(406) 727-7400 ext.24 Great Falls
Partners for Wildlife (PFW)	Wetlands	Financial, technical	USFWS	Jim Stutzman	(406) 727-7400 ext. 24 Great Falls
Swampbuster/ Wetland Conservation Provisions	Wetlands	Technical	NRCS	Dave Heilig	(406) 587-6789 dheilig@mt.nrcs.usda.gov Bozeman
Wetland Protection Development Grants Program	Wetland protection programs State and local governments	Financial	EPA/DEQ	Steve Potts Lynda Saul	(406) 441-1140, ext.232 potts.stephen@epa.gov (406) 444-6652 lsaul@state.mt.us Helena
Wetland Development Program	Wetlands	Financial	BOR	Rick Blaskovich	(406) 247-7311 rblaskovich@gp.usbr.gov Billings
WHIP	Owned lands that are not in mitigation or wildlife program	Financial, technical	NRCS	Dave Heilig	(406) 587-6789 dheilig@mt.nrcs.usda.gov Bozeman
WRP	Restorable wetlands	Financial, technical	NRCS	Dave Heilig	(406) 587-6789 dheilig@mt. nrcs.usda.gov Bozeman

*Acronyms are explained in a chart on the inside back cover

A Detailed Guide To Wetlands Assistance*

Source	Eligibility	Financial Assistance	Contact
Challenge Cost-Share Program of the Bureau of Land Management, uses various cost-share and specially appropriated funds for riparian/ wetland work on public land in Montana.	Priorities include riparian/ wetland projects.	Annually provides over $400,000 to match with non-federal goods, in-kind services, and funds to accomplish work with fish, wildlife, and threatened and endangered species and riparian programs. Non-federal partners include MFWP, Ducks Unlimited, universities, and Trout Unlimited	Bob Haburchak (406) 255-2798 Billings
Conservation Reserve Program (CRP) offers annual rental payments and cost-share assistance to establish long-term resource-conserving vegetation on eligible land. Note: The Waterbank Program, which is referred to in Chapter Two's case studies, is no longer accepting new contracts; landowners now enroll in CRP.	1. Cropland that was planted to an agricultural commodity two of the five most recent crop years. 2. Marginal pasture land that is suitable for use as a riparian buffer to be planted to trees. Acreage must be eligible by NRCS determination and suitable for cross wind trap sites, riparian buffers, filter strips, grassed waterways, shelterbelts, field windbreaks, living snow fences, contour grass strips, salt tolerant vegetation, shallow areas for wildlife	The **Commodity Credit Corporation (CCC)** makes annual rental payments based on agriculture rental value of the land and provides cost-share assistance in the amount equal to not more than 50 % of the participant's cost in establishing approved practices. The duration of the costs are from 10-15 years. CCC will pay up to 50% of the cost of establishing permanent cover.	Dave Heilig (406) 587-6789 dheilig@mt.nrcs.usda.gov Bozeman
Debt For Nature Program (Conservation Contract Program) offers a conservation contract in exchange for a borrower's indebtedness to the Farm Service Agency. These contracts can be established for conservation, recreational and wildlife purposes on farm property that is wetland, wildlife habitat, upland or highly erodible land.	USDA borrowers who have highly erodible lands, wetlands and special kinds of habitat that may support particular wildlife.	Loan adjustment made according to a formula in exchange for 50-year or 10- year contracts. *Pete Husby*	Dave Heilig (406) 587-6789 dheilig@mt.nrcs.usda.gov Bozeman Roger Meredith (406) 587-6786 Mel Yost (406) 587-6799 USDA Farm Service Agency

ns are explained in a chart on the inside back cover

A Detailed Guide To Wetlands Assistance*

Source	Eligibility	Financial Assistance	Contact
Emergency Watershed Program/ Floodplain Easement Program works through local government sponsors and helps participants solve natural resource and related economic problems on a watershed basis. Projects include watershed protection, flood prevention, erosion and sediment control, water supply, water quality, fish and wildlife habitat enhancement, wetlands creation and restoration, and public recreation in watersheds up to 250,000 acres in size. Technical and financial assistance is available for installation of improvement projects to protect, develop, and use the land and water resources in small watersheds.	Local or state agency, county, municipality, town or township, soil and water conservation district, flood prevention or flood control district, tribe or tribal organization, or nonprofit agency with authority to carry out, maintain, and operate watershed improvement works.	Technical assistance and counseling, plus cost-share assistance. Funds cover: • 100% of flood prevention construction costs • 50% of construction costs related to agricultural water management, recreation and fish and wildlife • none of the costs for other municipal and industrial water management.	D. James Suit (406) 587-6822 jims@mt.nrcs.usda.gov Bozeman
Environmental Quality Incentives Program (EQIP) provides a single, voluntary conservation program for farmers and ranchers to address significant natural resources concerns.	Limited to persons who are engaged in livestock or agricultural production. Eligible lands include cropland, rangeland, forest land, pasture and other farm and ranch lands on which crops and livestock are produced.	Cost sharing up to 75% of actual costs of certain conservation practices. Incentive payments up to 3 years paid at a flat rate. Maximum of $10,000 per person for any fiscal year and $50,000 for any multi-year contract.	Dennis Loreth (406) 587-6795 dloreth@mt.nrcs.usda.gov Bozeman
Farmland Protection Program (FPP) helps farmers keep their land in agriculture. The program provides funding to state, tribal or local entities with existing farmland protection programs to purchase conservation easements. The program goal is to protect between 170,000 and 340,000 acres of farmland. Participating landowners can choose to keep their land in agriculture. Landowners retain all rights to the property.	Qualifying land must be • prime, unique or other productive soil • part of a pending offer from a state, local or tribal farmland protection program • privately owned • large enough to sustain agricultural production • accessible to markets for what the land produces and have adequate infrastructure and agricultural support services • have surrounding parcels of land that can support long-term agricultural production. All lands enrolled must have a conservation plan developed according to the NRCS Field Office Technical Guide.	USDA joins with state, local, or tribal governments to acquire conservation easements or other interests from landowners. *Judy McCarthy*	Dennis Froeming (406) 587-6794 dfroeming@mt.nrcs.usda.gov Bozeman Dave Heilig (406) 587-6789 dheilig@mt.nrcs.usda.gov Bozeman

**Acronyms are explained in a chart on the inside back cover*

A Detailed Guide To Wetlands Assistance*

Program Summary	Eligibility	Financial Assistance	Contact Person
Forest Stewardship Program (FSP) and Stewardship Incentive Program (SIP) are companion programs created by the 1990 Farm Bill to provide technical and financial assistance to landowners who want to protect and enhance their forest lands and associated wetlands and wildlife habitat. FSP provides landowners with a training workshop that prepares them to develop their own management plan.	Landowners must not derive most of their income from timber management on the property, must own 10-1,000 acres of forest land, and activities must be maintained for at least 10 years. Public access need not be provided for eligibility.	SIP provides 75% cost share for plan development and for implementation of planned practices.	Robert Logar (406) 587-6836 bob@mtso9.mt.nrcs.usda.gov Bozeman
Intermountain Riparian/ Wetland Resource Technical Team is involved with riparian and wetland technology development and transfer through bioengineering training sessions, riparian ecology training and management. They provide training and conduct riparian assessments for field office and Conservation District personnel.	Works with NRCS field offices and government agencies.	Not applicable	Chris Noble, Marcus Miller, Terry Costner, Sandra Wyman (406) 587-6924 swyman@mt.nrcs.usda.gov Bozeman
MARSH (Matching Aid to Restore States Habitat Program) is a program of Ducks Unlimited to enhance waterfowl habitat.	Proposals from any public agency or private conservation group that can: • execute long-term habitat agreements • deliver and manage the projects proposed • assume all liability associated with the project	Cost-shared assistance up to 50%. Costs exceeding this amount require special approval.	Steve Bayless (406) 458-5794 Helena
Montana Migratory Game Bird Stamp Program sells stamps and associated art to raise $200,000 annually for wetland development projects. The emphasis is on wetland habitat projects that will increase waterfowl production and brood survival—generally shallow wetland creation and restoration. Sites with adequate nesting cover near the wetlands receive priority and typically include large tracts of native or introduced grasses/legumes.	Areas with good adjacent upland nesting cover such as native rangeland or CRP enrolled acres. Eligible practices include restoring drained wetlands, constructing new reservoirs, repairing breached dams or damaged spillways, installing water control structures, establishing suitable upland nesting cover, and working with landowners to implement managed grazing systems. Program generally requires reasonable public access controlled by the landowner.	Up to 100 % of construction costs; generally focuses on sites where work is to be completed at a cost of $1000-$2000 per wetland surface acre.	Jeff Herbert (406) 444-2612 Helena
North American Waterfowl Management Plan (NAWMP) and North American Wetland Conservation Act (NAWCA) work together to reverse waterfowl declines in U.S., Canada and Mexico. Partners pool resources to conserve millions of acres of waterfowl habitat in areas deemed critical to waterfowl. The joint ventures pursue non-regulatory strategies that can be implemented through voluntary and cooperative actions.	Projects that fall within established joint ventures, such as the Prairie Pothole Joint Venture and the Intermountain West Joint Venture, receive highest priority. All who are interested in wetlands, waterfowl, other wetland wildlife, soil and water conservation and sustainable resources are encouraged to join these partnerships.	NAWCA is a principal fund source for the NAWMP. The Act created the North American Wetlands Conservation Fund designed to help support projects on public and private lands. A 9-member council reviews annual project proposals submitted by partners for funding.	Jim Stutzman (406) 727-7400, ext 24 Great Falls

Pete Husby

** Acronyms are explained in a chart on the inside back cover*

A Detailed Guide To Wetlands Assistance*

Program Summary	Eligibility	Financial Assistance	Contact Person
Partners for Fish and Wildlife Program (PFW) provides funding and technical assistance to private landowners interested in fish and wildlife habitat projects on their land. PFW evaluates projects from a biological and cost/benefit standpoint. In addition to wetland habitat work, PFW also does instream and riparian restoration, fish and wildlife-friendly irrigation systems, and a myriad of other projects.	Landowner must sign a Wildlife Extension Agreement (WEA), which does not require landowners to provide hunter access. Montana focus areas include the Blackfoot Valley, Rocky Mountain Front, Beaver Creek, Mission Valley and Centennial Valley.	Program is flexible and considers the landowner's economic goals. $500,000 to $750,000 available in Montana annually. Matching funds and fund raising partnerships are critical.	Jim Stutzman (406) 727-7400, ext 24 Great Falls
Swampbuster/ Wetland Conservation provisions help preserve the environmental functions and values of wetlands, including flood control, sediment control, groundwater recharge, water quality, wildlife habitat, recreation, and esthetics. The 1996 Farm Bill changed Swampbuster to give producers greater flexibility to comply with wetland conservation requirements and to make wetlands more valuable and functional.	Participants in USDA programs, such as farmers, ranchers and any other program beneficiaries.	Not Available	Dave Heilig (406) 587-6789 dheilig@mt.nrcs.usda.gov Bozeman
Wetland Development Program provides grants or cooperative agreements to public or private organizations for improvement of wildlife associated with water systems or supplies affected by BOR projects.	Projects of conservation districts and private conservation groups that address wildlife habitat needs within a given area. Existing programs in a basin where BOR water supplies are being affected.	The limited private lands authority under this program provides challenge cost-share opportunities.	Rick Blaskovich (406) 247-7311 Billings
Wetland Protection Development Grants Program makes grants available to states and tribes for development and/or enhancement of wetlands protection programs; for training leading to development of state wetlands protection programs; and for wetland protection demonstration and restoration projects.	Eligible entities include state wetlands agencies, state water quality agencies, state agencies with wetland-related programs, federally recognized tribes; and local governments. Partnerships with others are eligible.	Grants awarded on a competitive basis within an EPA region. Recipients must cost-share a minimum of 25% of each award's total project costs. Proposals are submitted annually in late fall. Grants for wetland conservation or protection program development; no funding for operations.	Steve Potts (406) 441-1140, ext 232 Helena, MT Lynda Saul (406) 444-6652 lsaul@mt.gov Helena

Acronyms are explained in a chart on the inside back cover

A Detailed Guide To Wetlands Assistance*

Program Summary	Eligibility	Financial Assistance	Contact Person
Wetlands Reserve Program (WRP) provides landowners with financial incentives to restore, create and enhance wetlands. Landowners may establish a conservation easement or enter into a cost-share restoration agreement. Landowners voluntarily limit future use of the land, yet retain private ownership. Landowners and the NRCS develop a plan for the restoration and maintenance of the wetland.	Easement participant must have owned the land for at least one year. Owner can be an individual, partnership, association, corporation, estate, trust, business or other legal entity, a state (when applicable), political subdivision of a state, or agency of a state. Land must be restorable and be suitable for restoration and wildlife benefits.	WRP provides three options to the landowner: • Permanent Easement: USDA purchases easement (price is lesser of the land value or payment cap); USDA pays 100% of restoration costs • 30 year Easement: Pays 75% of what would be paid for a permanent easement and 75% of restoration costs • Restoration Cost-share Agreement: Minimum ten-year agreement to restore degraded wetland habitat. USDA pays 75% of restoration costs	Dave Heilig (406) 587-6789 dheilig@mt.nrcs.usda.gov Bozeman
Wildlife Habitat Incentives Program (WHIP) is for people who want to use both technical assistance and cost-sharing to help establish and improve fish and wildlife habitat. Participants work with NRCS to prepare a wildlife habitat development plan in consultation with the local Conservation District and partners. The plan describes the landowner's goals for improving wildlife habitat, includes a list of practices and a schedule for installing them, and details the steps necessary to maintain habitat for the life of the agreement.	Individuals must own or have control of the land under consideration, and cannot have the land already enrolled in mitigation or programs that have a wildlife focus, such as the WRP.	USDA pays up to 75% of the cost of installing wildlife enhancement practices.	Dennis Loreth (406) 587-6795 dloreth@mt.nrcs.usda.gov Bozeman

Pete Husby

** Acronyms are explained in a chart on the inside back cover*

SECTION 4 Wetland Laws, Permits & Regulations

During the past 25 years, our scientific understanding of the value and functions of wetlands has increased, and so has our society's commitment to protecting wetlands. Our laws express that commitment, and government regulations implement the laws. This section describes wetland protection laws and provides charts to help you navigate the mazes of permits and regulatory requirements.

What Is A Wetland?

Wetlands protection agencies have adopted a consistent definition developed by the Army Corps of Engineers (ACOE), as found in The Wetlands Delineation Manual of 1987:

Wetlands are those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

This definition is based on hydrology, hydric soils and hydrophytic vegetation. (See also page 4, Section 2.) Only areas that meet all three criteria are regulated wetlands that are subject to federal regulation.

What about artificial wetlands?

The Natural Resources Conservation Service (NRCS) defines an artificial wetland as land that was not a wetland under natural conditions, but now exhibits wetland characteristics due to human activities. Human-induced wetlands, like those under irrigation, may meet the requirements of wetlands by water, soils, and vegetation and still not be subject to ACOE regulatory authority.

It is also possible that the artificial wetland may not be subject to regulation in the NRCS Swampbuster Program but can be regulated by the ACOE under Section 404 of the Clean Water Act. The ACOE decides, on a case by case basis, if a human-induced wetland is subject to protection.

Judy McCarthy

Glacial prairie pothole near Ovando.

Pete Husby

Bullrush (Scirpus maritima) in wetland north of Roy, Montana.

Key Federal Laws Affecting Wetlands

Clean Water Act (CWA) of 1972	Regulates pollution and is administered wholly by the EPA and state agencies, except for Section 404, jointly administered by the ACOE and EPA.
National Environmental Policy Act	NEPA requires that all federal government agencies prepare environmental impact statements on relevant major federal actions
Executive Order 11990	Requires federal agencies to take action to minimize the destruction, loss or degradation of wetlands and to preserve the natural values of wetlands on federal lands (Notice that this is not a law, so its binding affects differ.)
Rivers and Harbors Act	Gives authority to the ACOE to prohibit discharge of solids or construction into tidal and navigable or adjacent waters
Food Securities Act of 1985	"Swampbuster," denies federal subsidies for conversion of wetlands to agricultural uses
Endangered Species Act	Administered by the U.S. Fish and Wildlife Service, protects wetlands that offer unique habitat for endangered and threatened species

Section 401 requires that states review and certify federal permits that may result in pollution discharges into surface waters and wetlands

Section 402 requires a permit for any discharge of pollutants from a point source into navigable waters

Section 404 administered by the Army Corps of Engineers (ACOE), governs dredging and filling in jurisdictional waters

Montana State Laws Affecting Wetlands

Montana has little legislation dealing directly with wetlands although the Montana Environmental Policy Act and two Montana Administrative Rules do regulate activities that may affect wetlands. (See Regulations Maze Chart which follows)

Tribal Laws Affecting Wetlands

Tribal governments in Montana safeguard the health, welfare, and economic security of their people. They protect aquatic resources including wetlands that are critical for water quality, fisheries and wildlife. The Confederated Salish and Kootenai and Blackfeet Tribes currently have regulations and ordinances in place. The tribes on the other five reservations in Montana are also developing wetland programs and strategies. If you own land adjacent to or within reservation boundaries, you need to consult with the appropriate tribal government office about wetlands on your property.

Wetlands on the Flathead Reservation

The Confederated Salish and Kootenai Tribe has specific tribal codes for wetland management. One ordinance addresses the banks below the high water mark of the south half of Flathead Lake and another ordinance protects wetlands and riparian areas throughout the remainder of the reservation. The Aquatic Lands Conservation Ordinance (ALCO) prevents degradation of Reservation waters and aquatic lands by regulating construction whenever such a project will cause erosion, sedimentation, or other disturbances adversely affecting water quality. Permits are obtained and processed through the Shoreline Protection Program Office of the Confederated Salish and Kootenai Tribe. Failure to comply with the permit terms may result in law enforcement. Presently, the Confederated Salish and Kootenai Tribe is developing a comprehensive management plan that includes a no net loss policy and wetlands guidelines. The plan has been evolving for the past 10 years, and includes wetlands mitigation for the 1.25 million acre Flathead Reservation.

Pete Husby

Potholes near Charlo, Montana

The Blackfeet Nation's Wetlands Plan

Mary Clare Weatherwax, Wetlands Program Coordinator for the Blackfeet Nation, explains the tribe's wetland authority:

In 1993, the Blackfeet Tribe passed Ordinance 90, the Aquatic Lands Protection Ordinance. The tribe issues permits for all construction and fill projects that occur in wetlands, riparian areas and streams. The tribe has authority to fine anyone who works in wetlands or waters of the reservation without a permit, to revoke a permit for non-compliance of permit conditions, and to require restoration or replacement of damaged wetlands, riparian areas and streams.

The main way the Blackfeet Tribe currently protects wetlands is through the use of Ordinance 90, the Aquatic Lands Protection Ordinance. This tribal ordinance requires that a permit be issued through the Tribal Water Resources Department in order for work to begin in a wetlands area. The administrator for Ordinance 90 is the Blackfeet Water Resources Department Director, Mike Tatsey. He works collaboratively with the Blackfeet Environmental Office Director, Gerald Wagner, to issue permits and violation notices. The Water Resources Department hosts regular meetings with the other natural resources staff to make comments on all proposed actions/permits. Additionally, the tribe coordinates their efforts with the Army Corps of Engineers (Section 404 permitting), and with the Environmental Protection Agency (Section 401 Water Quality Certification). The tribe has also created a draft Wetlands Management Plan in order to protect wetlands on the reservation.

The Blackfeet Tribe Wetlands Protection Program is funded through the EPA and the goal is development of a wetlands protection program on the Blackfeet Indian Reservation. In order to meet that goal, the tribe has a wetlands monitoring program that has collected baseline data on a subset of wetlands in all four watersheds within the reservation boundary. A draft wetlands management plan has been developed, specifying how wetlands will be protected on the reservation. In addition, the Wetlands Protection Program is involved in several wetlands creation projects on the Blackfeet Indian Reservation, and works with Aquatic Lands Protection ordinance permits that are issued on the reservation by the Water Resources Department.

Navigating The Permit Maze *

Typical Question	Answer	Permit #	Agency	Contact	Waiting Period
"I want to build an access road across the wetland to get to my new house. Do I need a permit?"	Yes				
"I want to clear away some shrubs and brush on my wetland. Can I use a bulldozer and grader?"	Heavy equipment requires a permit. Hand-held equipment, such as chainsaws and shovels, may be used without a permit.	404	ACOE, or DEQ may be contacted regarding water quality issues	Allan Steinle or staff 406-441-1375	Usually 30 days for projects of minimal environmental impact and 60-120 days for major impact.
"I want to build a pond. Do I need a permit?"	Yes. You need a permit to use heavy equipment in a wetland or drainage area to excavate, or to build an impoundment or berm.		Submit application for 310 permit to local Conservation District (CD). Depending on the nature of the work and the location, the DEQ and DNRC may also need to be contacted.	Local County Conservation District (CD)	Local CD, which meets monthly, determines if a permit needed. If so, CD will schedule inspection and submit a report at the next meeting. If a 310 permit is given, it is valid for 1 year. March is a good time to submit application for permit, which is usually needed by August.
"I want to build a gravel bar to direct the flow of stream water into the irrigation ditch. Do I need a permit?"	Yes	310			
"Do I have a wetland? I need to know for a building project."	Find out from a consultant or NRCS, who will locate your land on a soil map. (You must have legal description of property in writing.) If your land contains hydric soil, NRCS will refer you to a list of wetlands consultants for a wetland delineation. If dredge or fill is needed, ACOE must be consulted.	Possibly 404. If minor disruption (<3 acres), you may be able to proceed under a nationwide permit. You need a letter from ACOE confirming this.	USDA, NRCS, ACOE	Local NRCS (Also provides a wetlands technical guide of regional wetland plants.) Allan Steinle or staff 406-441-1375	Time to check soil map (1 hour to 2 days). Schedule depends on consultant, demands, area of land and coordination with others. Usually 30 days for projects of minimal environmental impact and 60-120 days for major impact.

** For further reference see: "A Guide To Stream Permitting in Montana", March 1997, available from your local conservation district office.*

Navigating The Regulations Maze *

Regulation	Purpose	Examples of Activities Affected/Regulated	Permit	Agency/Contact Person
Clean Water Act: Section 404 and Executive Order #11990, Wetland Mitigation	Mitigates wetland impacts associated with federally funded transportation projects.	Highway construction, bridge and culvert replacement.	MDT tracks their wetland losses and mitigates in accordance with no net loss policy	Larry Urban, MDT 406-444-6224
Clean Water Act: Section 401 Water Quality Certification	Ensures that actions related to any federal permit or license are consistent with the state's water quality standards.	Pond enlargement, filling for commercial and family dwellings, pipeline construction, roadway construction.	401 Certification	Jeff Ryan, DEQ 406-444-4626
Clean Water Act: Section 404 Advanced Identification, Permit Review, Dredge and Fill Permit	Restores and maintains chemical, physical, and biological integrity of national waters, including wetlands, by regulating the placement of dredge and fill material.	Pond excavation, bank stabilization, culverts or bridges across wetlands, utility line crossings, boat ramps.	404 Permit	Dick Blodnick, EPA 406-441-1140, ext. 231 Jean Ramer, ACOE 406-441-1375
Endangered Species Act, and Fish and Wildlife Coordination Act	Provides a means to conserve ecosystems upon which the endangered and threatened species depend.	Drainage of a wetland, blockage of fish passage, and habitat destruction.	404, reviewed by USFWS	Rob Hazelwood, USFWS 406-449-5225
Federal Clean Water Act, Montana Water Quality Act, Montana Administrative Rule 17.30.1301	Controls movement of sediments from construction sites and other activities.	Construction, industrial, and mining and gas activities that discharge storm waters to state waters	Montana Pollution Discharge Elimination System (MPDES) Permits	DEQ, Fred Shewman 406-444-5329 Nicholas Bugosh 406-444-3927
Montana Administrative Rule 26.6.601	Protects riparian zone from logging practices.	Burning, clearcutting, operating vehicles off established roads, disposal of hazardous or toxic materials in a manner that pollutes wetlands or that may cause damage to humans, animals or plants	Streamside Management Zone Permit	DNRC, 406-542-4300
Montana Administrative Rule 16.20.633 (3)	Temporarily exempts certain construction action in water from turbidity water quality standards.	Bridge construction, streambank stabilization, channel construction	Short Term Exemption from Montana's Surface Water Quality Standards (3A)	Jeff Ryan, DEQ 406-444-4626
Montana Environmental Policy Act	Ensures that state acts which may impact wetlands be analyzed and documented in an environmental impact report and opportunity for public comment where appropriate.	Logging, fire management, permitted grazing, any construction activities that impact the environment	State agency reviews impacts	Environmental Quality Council 406-444-3742
National Food Security Act, Swampbuster Provision, 1985, 1990, 1995	Protects wetlands.	Draining wetlands for agricultural purposes	None	Dave Heilig, NRCS 406-587-6789
National Environmental Policy Act and National Environmental Protection Act	Ensures that government acts that impact wetlands are analyzed and documented in a detailed environmental impact report.	Logging, fire management, permitted grazing, any construction activities that impact the environment	Federal or state agency reviews impacts	Generally, the agency with authority over the action.
Natural Streambed and Land Preservation Act	Requires permit to engage in any activity that will modify a stream, its bed or banks	Irrigation diversions, streambank stabilization with riprap, equipment crossings, culverts, bridges, dams	310 Permit	MT Association of Conservation Districts, 406-443-5711; or county CD or NRCS

** For further reference see: "A Guide To Stream Permitting in Montana", March 1997, available from your local conservation district office.*

We hope the preceding pages have helped you find your way through the permits and regulations of wetland protection laws. Now that you know more, perhaps you see the importance of any actions you decide to take on your land. We hope this Landowner's Guide has made it easier for you to manage your wetlands with care.

Acronyms In This Guide

ACOE- US Army Corps of Engineers

BLM- Bureau of Land Management

BOR- Bureau of Reclamation

CD- Conservation District

CRP- Conservation Reserve Program

DEQ- Department of Environmental Quality

DU- Ducks Unlimited

EPA- Environmental Protection Agency

EQIP- Environmental Quality Incentives Program

FSA- Farm Service Agency

FSP/SIP- Forest Stewardship Program/Stewardship Incentive Program

MARSH- Matching Aid to Restore States Habitat Program

MDFWP- Montana Department of Fish, Wildlife and Parks

NAWCA/NAWMP- North American Wetland Conservation Act/ North American Waterfowl Management Plan

NRCS- Natural Resources Conservation Service

PFW- Partners for Wildlife

USDA-United States Department of Agriculture

USDI- United States Department of the Interior

USFWS- United States Fish and Wildlife Service

WHIP- Wildlife Habitat Incentives Program

WRP- Wetlands Reserve Program

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A Story of Helena Valley's Wetlands

Imagine it is 1827; a trapper visits the broad valley where Helena will lie before the coming of the next century. He arrives in late summer and watches the vegetation turn golden brown under the feet of the abundant deer, antelope, and elk herds. Wildlife is everywhere, but any animal heavier than the nimble, white-tailed deer must avoid the vast marshlands surrounding the convergence of the creeks soon to be known as the Prickly Pear, Ten Mile, and Silver.

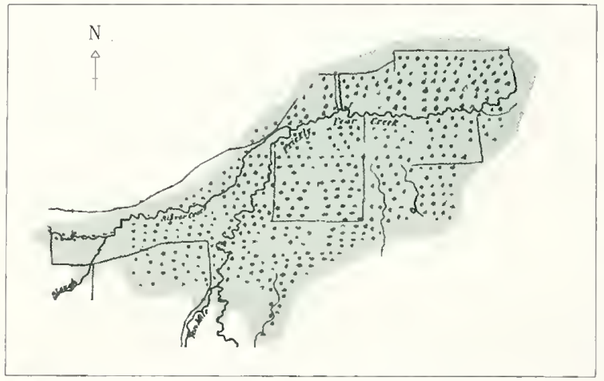
Temperatures drop, freezing the flooded, spongy marshlands just as the bison herds arrive from the higher intermountain valleys. With the thickening of ice, the thousand-plus pound shaggy creatures move across the frozen ground, grazing on the rich wetland vegetation inaccessible to them throughout the summer.

Over the course of a single generation, the valley becomes a different place. No longer do bison make their annual migration to this winter range; the void left by their disappearance is filled with domestic cattle driven from Texas.

As the 19th century came to an end and the 20th century began, declining cattle ranching, followed by increased interest in farming, eventually led to extensive projects designed to drain the wetlands of the Helena Valley. These projects diminished the ability of the land to store water and moderate flooding.

Currently, expanding commercial and homesite development threaten many of the valley's remaining wetlands. Continued destruction of these ecologically important areas reduces the quality and quantity of water, natural flood control, open space, wildlife habitat, hunting, and wildlife viewing available to our community.

The two maps below represent the same portion of the Helena Valley, 130 years apart. The upper map indicates an extensive marshland area, while the lower one shows a much smaller area where Lake Helena and its surrounding wetlands are located. A comparison of these maps, and information gathered by the Partnership, indicates a significant loss of valuable wetlands in the valley over the past century.



Historic wetland area indicated on 1868 government survey map of the Helena Valley

Depiction of current Lake Helena and surrounding wetlands from a 1999 National Wetlands Inventory map.

For more information contact:

Helena Wetland Community Partnership -

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Other Resources -

- Montana Watercourse
  201 Culbertson Hall, MSU, Bozeman, Montana 59717: 994-6671.
- MT Dept. of Environmental Quality - Statewide Wetlands Coordinator
  P.O. Box 200901, Helena, MT 59620: 444-6697
- MT Wetlands Information Clearinghouse
  http://nris.state.mt.us/wis/MWICedit.html

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Illustrations by: Ron Jenkins, Charlo, Montana

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Wetlands in the Helena Valley

A Community Partnership Project

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Concerned about wetland losses, the Helena Wetlands Community Partnership has worked since 1998 to gather information about local Partnership, along with volunteers, wetlands in the Helena Valley to better provide our community.

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WETLAND
PAMPHLET
2001

The Helena Wetlands Community Partnership

The Partnership, a pilot project designed to inventory the wetlands in the Helena valley, is a collaborative effort involving the County and local non-government organizations (see list of partners on back). The project is a model for other communities seeking to understand local wetland resources. Using the National Wetlands Inventory as a base, the Partnership developed a more complete picture of the Helena Valley wetlands through on-the-ground field observations and historical research.

Exploring Wetlands

What do we find in wetlands?

- water at or near the surface all or part of the year
- soils that are poorly drained and retain water
- plants adapted to living in wet soils - plants like rushes, willows, and cattails
- more species of plants and animals than the surrounding landscape
- more species of Montana's birds than any other habitat; wetlands are especially important for waterfowl, shorebirds, and many songbirds
- many unique creatures like spotted frogs, bull trout, water striders, painted turtles, moose, and Marsh Wrens

Wetlands ~ Why are they important?

Wetlands provide:

- open space/parkland in an expanding urban environment
- critical wildlife habitat
- recreational areas
- science education resource
- flood control (Ten Mile, Prickly Pear, Seven Mile and Silver Creeks)
- water quality (absorb and transform chemicals and nutrients)
- sediment filtration
- groundwater recharge (replaces water lost to or diverted by urban development)
- surface water recharge (keeps creeks flowing longer during late summer)
- erosion control (soil stabilization along riparian corridors, lake and pond shorelines, as well as seasonal floodways)

What kind of wetlands do we have in the Helena Valley?

- **Riverine wetlands**: wetlands associated with flowing water of rivers and streams
- **Lacustrine wetlands**: wetlands that are associated with lakes and reservoirs
- **Depressional wetlands**: low spots on the landscape that collect water during all or part of the year
- **Man-made wetlands**: man-made areas where the unique characteristics of wetlands (wetland plants, soils, and water) are present; along some irrigation ditches, for example

Wetland bordering Lake Helena by Ed Tyanich

Wetlands ~ Why are they important for me?

Wetlands:

- provide natural places to explore
- provide places for hunting and wildlife viewing
- provide places for recreation
- provide places for educating our children about important natural processes
- absorb high levels of run-off and help protect against flooding
- purify water making it cleaner and healthier to drink
- provide water for our use that would otherwise be lost as run-off
- give us water in times of low rainfall
- help prevent loss of important soils

What can I do?

- Protect your watershed - know where your water goes.
  Run-off from your yard and street drains to important wetlands. Never dump chemicals on your property or down stormdrains.
- Locate and visit your local wetlands.
  Become familiar with the plants, birds, and other wildlife found in these wet areas.
- Make sure your local wetlands are protected.
  As a landowner, you can create a management plan for your wetlands or consider a conservation easement to protect your land.
  As a citizen, you can work for ordinances that preserve open space and land-use planning measures that protect wetlands; ask for tax incentives to promote wetland protection and conservation easements; work to restore degraded wetlands; and make sure no wetlands are filled or otherwise destroyed.
- Educate others about the benefits of these wet areas.
  Tell your neighbors and friends how important wetlands are to providing clean, plentiful water to the community.
- Assist others in protecting wetlands.
  Support efforts to include local wetlands in land-use planning efforts in the Helena area - it will benefit all of us!

Field work - groundtruthing local wetlands by Pam Hackley